AUTOMOTIVE INDUSTRIES

AUTOMOTIVE and AVIATION MANUFACTURING

CIVILIAN AND DEFENSE

In This Issue . . . Future Engine Developments · · · Britain's Latest Military Planes · · · Steering Pusher Axle · · · New Equipment at Metal Show · · · Sports Cars at Watkins Glen · · · Precision Jet Engine Blades

OCTOBER 15, 1952

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A CHILTON PUBLICATION

Here's How Heald precision solved a vital ordnance problem

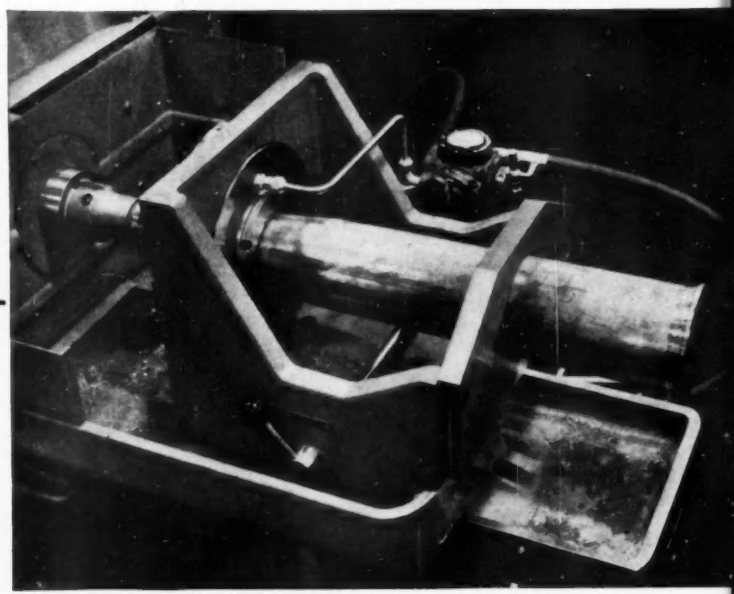
The successful salvage of used artillery shells calls for a high degree of accuracy and precision in the re-boring operation. Speed is important, too—to maintain high rates of production and keep salvage costs to the minimum.

These exacting requirements were easily met with the Heald Model 121 Bore-Matic shown below—arranged for re-borizing 90 mm shell cases. The work is held in a single-station angle-type fixture with a quick-acting air-operated collet chuck. Table is started left at rapid traverse, slows to bore, then reverses at rapid traverse. A retractable boring bar eliminates tool drag line during outstroke. Bar automatically rests to boring position when table reaches rest position.

Remember—when it comes to precision finishing, it pays to come to Heald.

Re-borizing on a Heald Model 121 Bore-Matic makes used 90 mm shells as good as new

Heald Model 121 Bore-Matic, arranged for fast, precision re-boring of 90 mm artillery shell cases.



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Heald precision speeds the nation's production

THE HEALD MACHINE COMPANY

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Packed with Power to Pull Heavy Oil Field Machinery Over Mountain Roads

Here it is again — the truckers' Diesel — making more miles and putting out peak payload performance for Crail Transportation Co. of Long Beach, California. It's hauling heavy oil field machinery . . as high as 100,000 lb. gross weight . . over mountain roads. "This engine has been very satisfactory in every way, and has met all our requirements fully," says Mr. A. W Swanson, Crail's president and general manager.

Among the many exclusive Diesel design features of Model 148-DK are—patented spherical combustion chamber for lively responsive acceleration, shock-free operation, clean burning, high fuel economy . . . . counterbalanced 7-bearing, hardened crankshaft . . . pressure oil jets to cool piston crown . . steel backed copper-lead-babbitt heavy-duty precision bearings. Get Bulletin 1532. 186

WAUKESHA MOTOR COMPANY, WAUKESHA, WIS.
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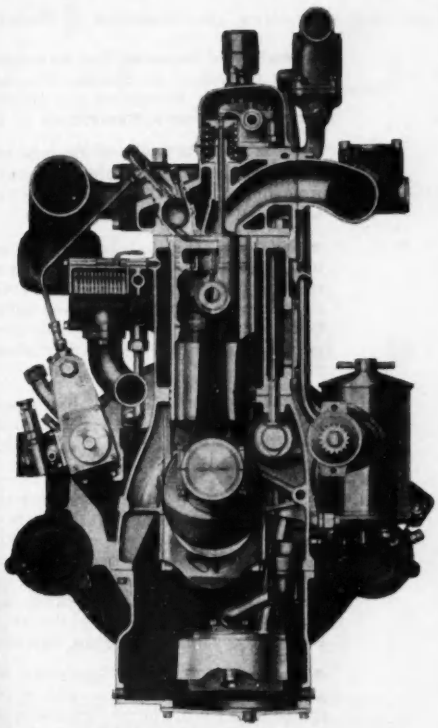

WAUKESHA High-Duty DIESEL Model 148-DK
six-cylinders, 5¼-in. bore x 6-in. stroke, 779 cu. in. displacement. Peak hp 200.

DURANICKEL

A wrought, age-hardenable, corrosion-resisting alloy

Duranickel® is a wrought, non-ferrous, slightly magnetic alloy. It has the higher strength found only in the heat-treated alloy steels, and not offered by other corrosion-resisting alloys available at comparable cost levels.

The principal engineering characteristics of Duranickel are:

● **Mechanical Properties:** The accompanying table shows the ranges of Ultimate Tensile Strength, Yield Strength, Elongation, and Hardness values for various forms and conditions of Duranickel.

● **Shear Strength:** Values for the ratio of maximum shearing strength to ultimate tensile strength range from approximately 0.5 to 0.6 and are comparable to those of mild and low-alloy steels.

● **Endurance Limit:** In rotating beam tests of polished specimens at room temperature and 10,000 rpm for 10^8 cycles, Duranickel hot-rolled showed an endurance limit of 51,000 psi.; hot-rolled, age-hardened showed 52,500 psi.; cold-drawn 51,000 psi.; and cold-drawn, age-hardened showed 61,000 psi.

● **Impact Strength:** Charpy impact strength ranges from 240 ft. lb. for hot-rolled Duranickel and 190 ft. lb. for cold-drawn, to 40 ft. lb., for the age-hardened condition.

● **Spring Properties:** Duranickel wire can be cold-drawn and age-hardened subsequently to develop tensile strength of the order of 225,000 psi. The torsional proportional limit of cold-drawn and age-hardened wire is about 40 per cent of the ultimate tensile strength. Duranickel springs are used at temperatures up to 550°F.; the stresses used should be governed by existing service conditions.

● **Working Characteristics:** Duranickel may be hot-worked, forged, and cold-worked. It can be machined most readily in the annealed condition and is commercially machinable in other conditions at hardnesses up to 275 BHN. The use of a cutting lubricant is essential for all machining work because Duranickel, like all high-nickel alloys, is characteristically "sticky" and tends to gall or build up on the tools. Duranickel can be joined by the usual welding, brazing and soft soldering processes common to industry.

● **Variants:** For special uses there are two alloys similar to Duranickel. They are: (1) Duranickel "R" containing a higher percentage of carbon for use where applications require optimum machinability. (2) Permanickel® having the same mechanical properties as Duranickel but different physical constants, particularly better electrical and thermal conductivity and stronger magnetic properties. Permanickel is preferred for service as springs requiring high electrical conductivity; equipment requiring good thermal conductivity and magnetostrictive units where high fatigue strength is required. Special applications include thermostat tension springs, reaction springs, clips, grid wires and side rods in vacuum tubes.

● **Corrosion Resistance:** The corrosion resistance of Duranickel in all its forms is of the same order as that of nickel to a wide variety of media, including mineral and organic acids, alkalies, salts, potable and industrial waters, food products, organic compounds and oxidizing atmospheres at normal and elevated temperatures.

● **Forms Produced:** Duranickel is supplied in most commonly used mill forms—rods, hexagons, squares, rounds, flats, strip, sheet, wire and welding materials.

● **Applications:** Duranickel is used in many applications where corrosion resistance, high hardness, and great strength are required. In the production of plastics, Duranickel is a standard material for dies, injection cylinders and extrusion screws. Duranickel springs, from both wire and strip, give excellent service. Instrument parts include diaphragms, bellows, flapper valve discs, snap switch blades, and grid wires and side rods in vacuum tubes.

Mechanical Property Ranges of Duranickel

Form and Condition	Tensile Strength 1000 psi.	Yield Strength (0.2% offset) 1000 psi.	Elongation in 2 in. per cent	Hardness Rockwell C
Rod and Bar				
Hot-finished	90-130	35-90	55-30	75B-22
Hot-finished, age-hardened	160-200	115-150	30-15	32-42
Cold-drawn, as-drawn	110-150	60-130	35-15	90B-32
Cold-drawn, age-hardened	170-210	125-175	25-15	32-42
Strip				
½ hard	130-155	.....	15-3	25-34
½ hard, age-hardened	170-210	.....	20-7	33-42
Spring	155-190	.....	10-2	30-40
Spring, age-hardened	180-230	.....	15-5	36-46
Wire				
Spring	160-200	.....	5-2	....
Spring, age-hardened	200-240	.....	10-5	....

FURTHER DATA AVAILABLE

A 22-page reference manual, *Engineering Properties of Duranickel*, Technical Bulletin T-32, contains all essential engineering information. It is available, free, for your files.

Nickel alloys are being increasingly diverted to defense applications. However, technical help for metal problems involving corrosion, high temperatures or fatigue is available from INCO'S Technical Service, either for immediate defense needs or for future installations.

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street, New York 5, N. Y.

INCO TRADE MARK **Nickel Alloys**

AUTOMOTIVE INDUSTRIES

Published Semi-Monthly

October 15, 1952 Vol. 107, No. 8

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AUTOMOTIVE INDUSTRIES is a consolidation of The Automobile (weekly) and the Motor Review (weekly) May, 1902; Dealer and Repairman (monthly), October, 1903; the Automobile Magazine (monthly), July, 1907, and the Horseless Age (weekly), founded in 1895, May, 1918.

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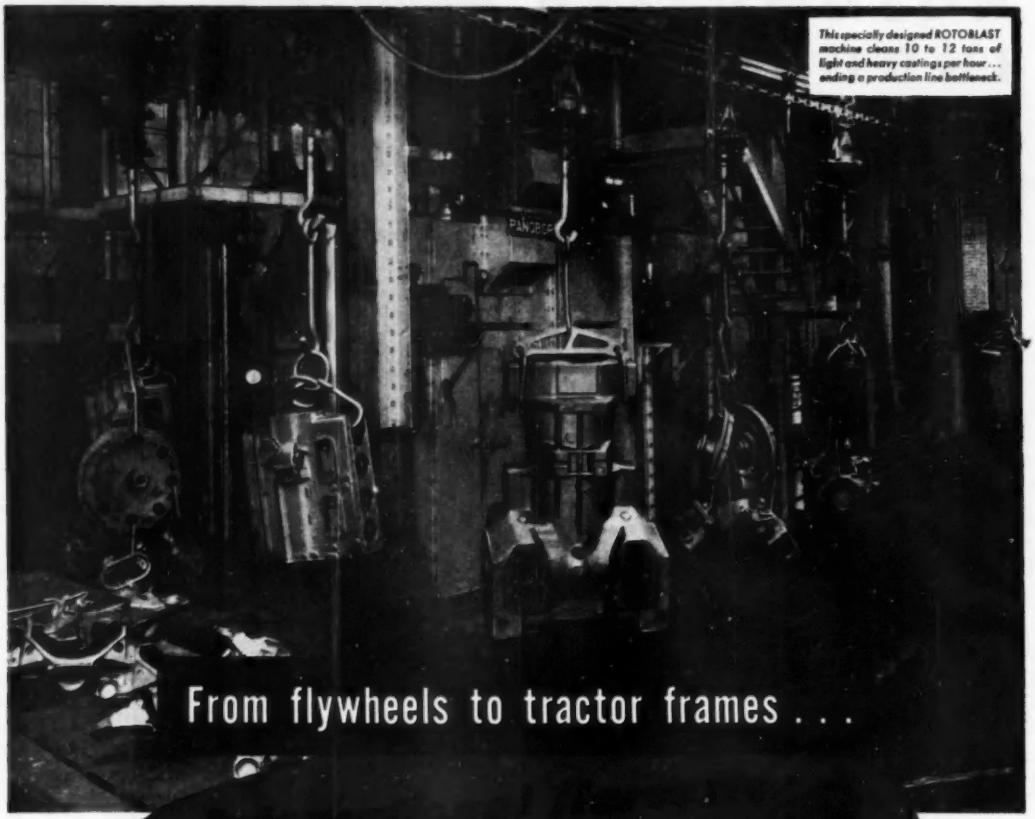
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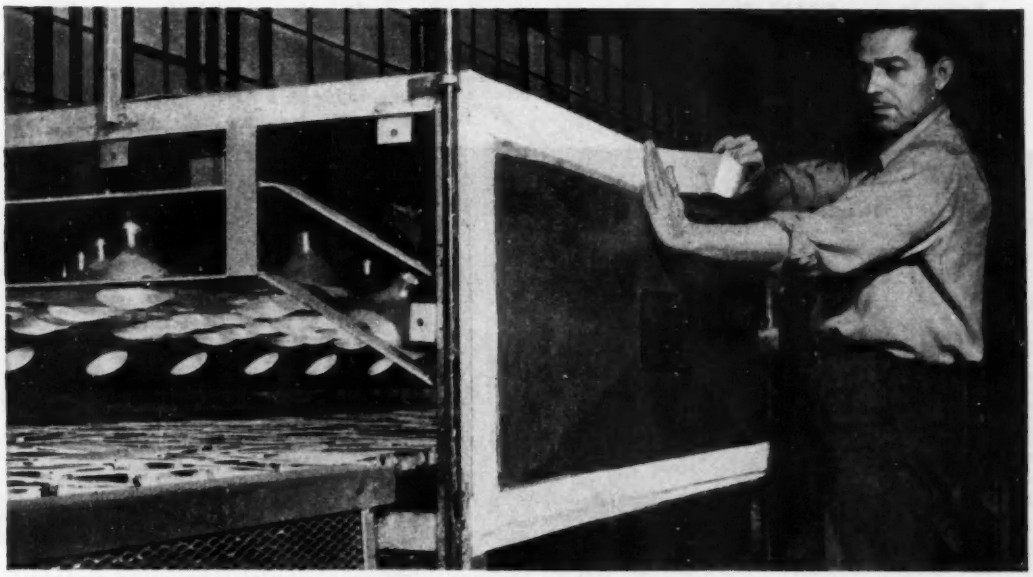

AN AIRTIGHT SEAL, YET INSTANTLY REMOVABLE. Polyken No. 290, flameproof glass fiber tape that resists 350° oven temperatures.

Polyken No. 290, flameproof glass fiber tape stands up under extreme heat of drying oven

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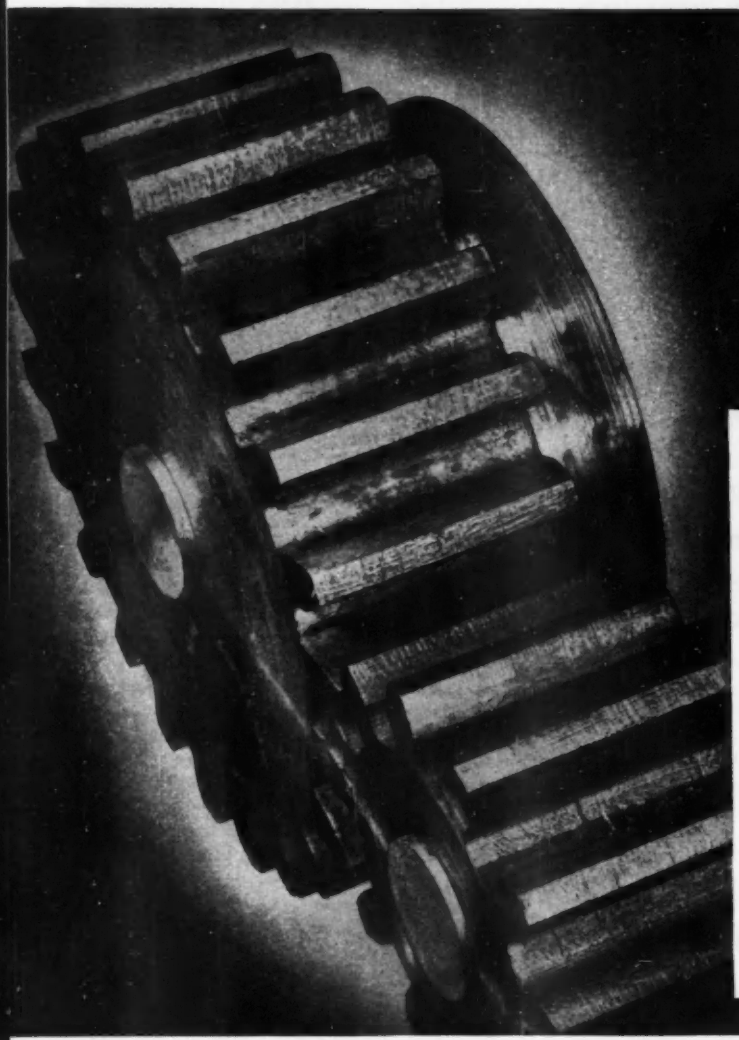

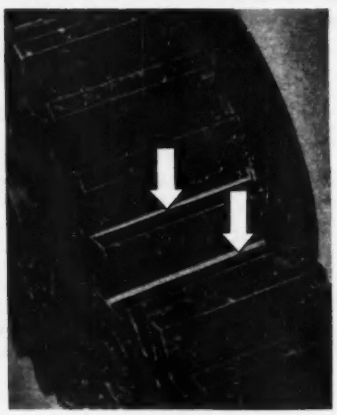

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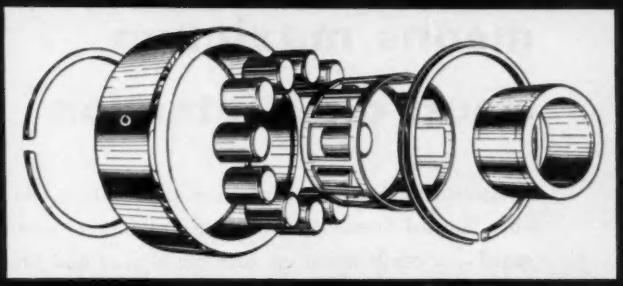

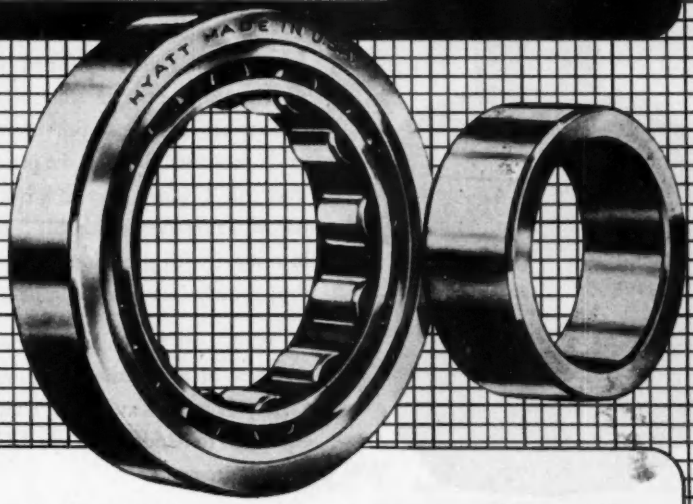

THIS A-TS type of Hyatt Roller Bearing is one of the popular Hy-Load series.

It is a separable inner-race type, high-capacity cylindrical roller bearing, made in two diameter series, wide and narrow widths, to standard boundary dimensions.

Separable parts are freely interchangeable. Any inner-race will fit any roller assembly of the same piece number, permitting non-selective fitting after preassembling the two bearing parts in separable machine elements.

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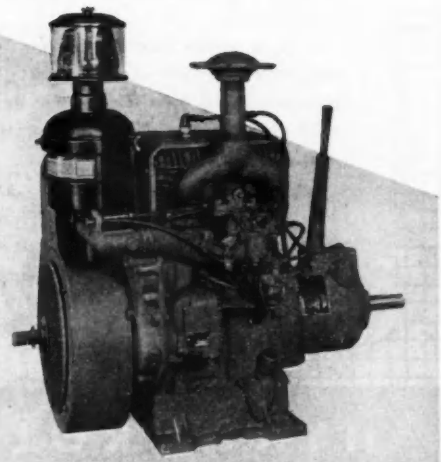

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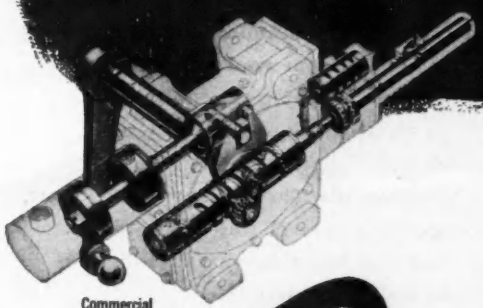

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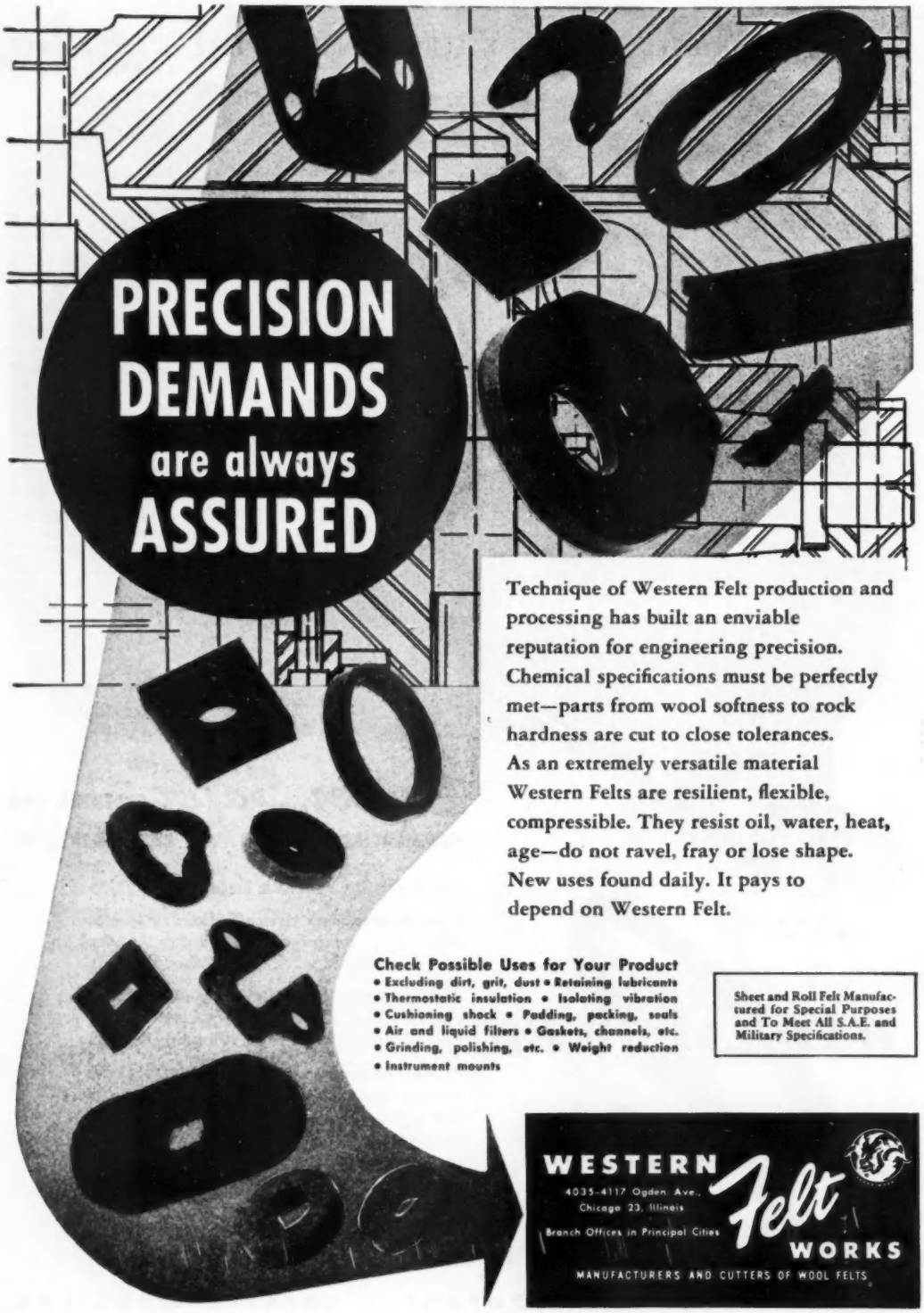

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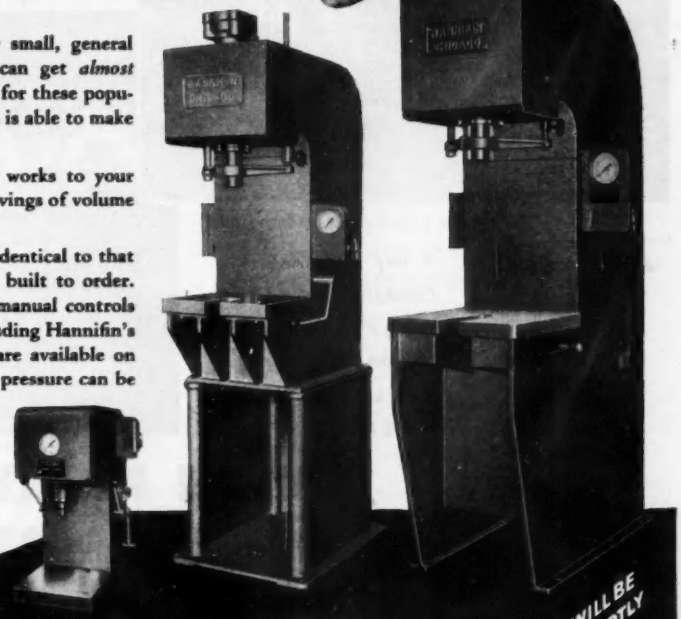

select the press you need from this chart...

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RAM SPEED (in.–min.) Up	800	345	240*	151*	254
PUMP (gpm.)	3.3	3.3	5*	5*	11
MOTOR (hp)	1½	1½	2*	2*	5
STROKE (in.)	6	6	10	10	12
GAP (in.)	10	10	16	16	22
REACH (in.)	6	6	7½	7½	10
BULLETIN	H-784	H-784	135	135	134

*Supplied with larger motor and pump when higher ram speed is required.

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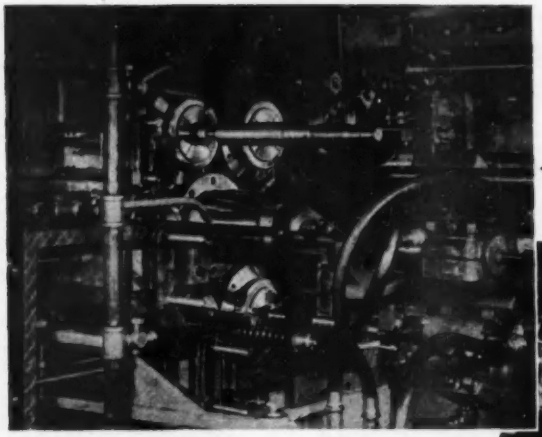
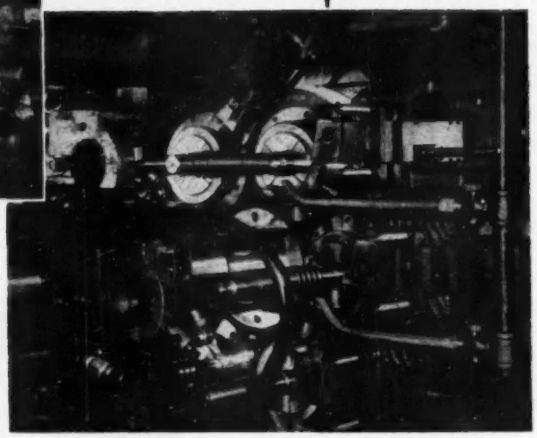
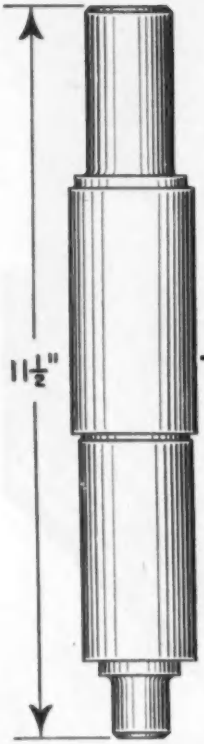


Tooling Area 3½ - SIX
Front Side Rear Side





Automotive Transmission Shaft

A very good reason why CONOMATICS handle a wider variety of machining operations per single chucking is their greater number of tooling positions.

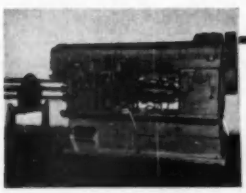
WITH MORE TO SELL THERE'S MORE TO TELL

Whether you're selecting a new golf club, motor car, or multiple spindle bar automatic, you want what best fits into the "scheme of things."

Before you can be sure that any product will meet your requirements you must have information. And you can judge only by that at hand or available. Complete information lets *you* decide what's important to *you*. That's as it should be.

There's always more information to be had about the product that has more to offer. It's that way about CONOMATICS. And you can always have *complete* information. If you will write, wire, or phone, you can have it now.

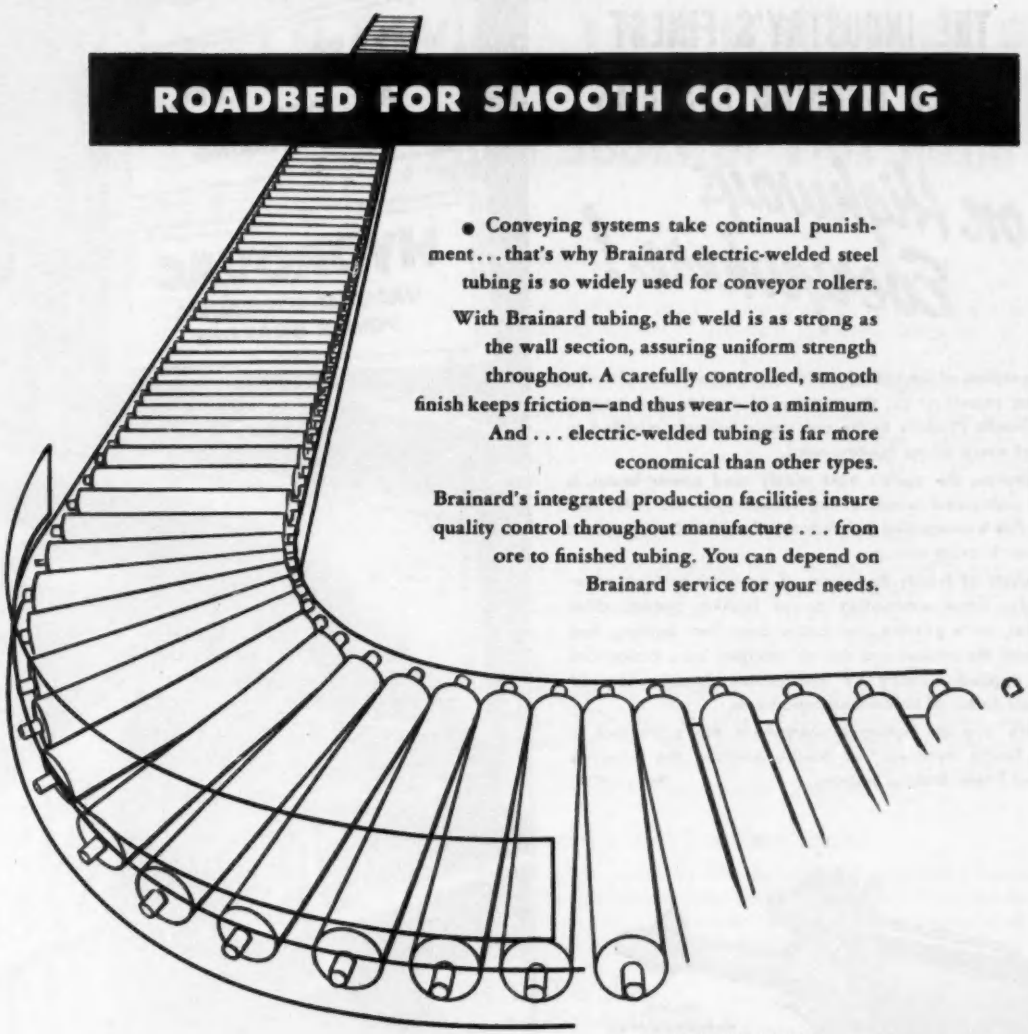
A Comparison of ALL Automatics is in favor of Cone



Conomatic CONE AUTOMATIC MACHINE COMPANY, INC. WINDSOR, VT., U.S.A.

another job for Brainard TUBING

ROADBED FOR SMOOTH CONVEYING



• Conveying systems take continual punishment... that's why Brainard electric-welded steel tubing is so widely used for conveyor rollers.

With Brainard tubing, the weld is as strong as the wall section, assuring uniform strength throughout. A carefully controlled, smooth finish keeps friction—and thus wear—to a minimum. And . . . electric-welded tubing is far more economical than other types.

Brainard's integrated production facilities insure quality control throughout manufacture . . . from ore to finished tubing. You can depend on Brainard service for your needs.

EASILY FABRICATED

Brainard tubing is a uniform product made to close tolerances. Has good machining qualities and finish can be supplied as specified. Easily fabricated—can be beaded, expanded, swaged, spun, flanged, upset, grooved, fluted, flattened, tapered, and otherwise formed. Supplied straight or fabricated, sizes ½" to 4" O.D.; .025 to .180 gage.

Fast delivery on certain sizes. For further information or catalog, write Brainard Steel Division, Sharon Steel Corporation, Dept. W-10, Griswold Street, Warren, Ohio.

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on Highways Everywhere!

Regardless of the size of vehicle or whether the preference is for vacuum or air, the trucking industry has come to look to Bendix Products as the one source uniquely qualified to meet every power braking need.

Hydrovac, the world's most widely used power brake, is the undisputed leader in the vacuum-hydraulic field. And Air-Pak is recognized as foremost in the field of air-hydraulic power braking units.

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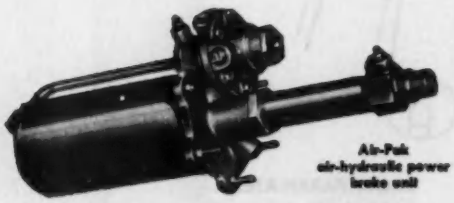
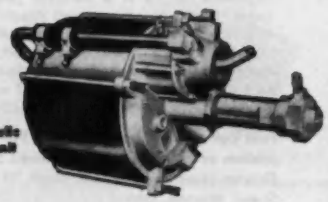
That's why on highways everywhere the preference is for Bendix Hydrovac* or Bendix Air-Pak, the Industry's Finest Power Braking Systems.

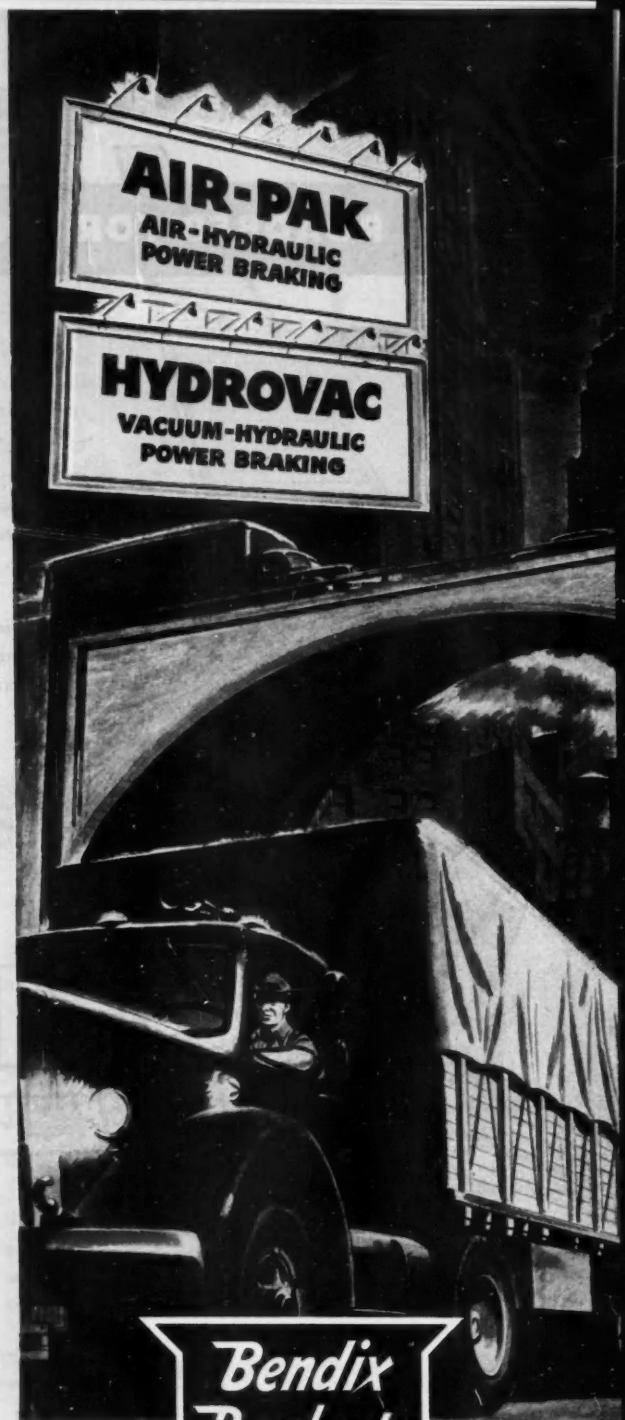
*REG. U. S. PAT. OFF.



Air-Pak air-hydraulic power brake unit



Hydrovac vacuum-hydraulic power brake unit



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High Spots of This Issue

Britain's New Military and Civilian Planes

The spectacular progress which England has made in the development of advanced aircraft of all types was amply demonstrated at the recent Farnborough Show. Presented here is a first-hand account of the planes displayed. Page 34.

Future Developments in Commercial Vehicle Engines

The modern truck is following closely on the heels of the automobile in the trend toward higher-output engines. The author sees the gas turbine and supercharged Diesel as particular aids in the achievement of this goal. Page 38.

Precision Jet Engine Blades from Rough Forgings

Mindful of the simplicity and labor saving inherent in such a technique, Ex-Cell-O Corp. has developed a method for making rotor element blading using fairly rough forgings. The process and machines used are fully described. Page 44.

Watkins Glen Sports Car Meet

Keen competition was the order of the day at this recent conclave of sports car enthusiasts. Notable design and mechanical features of cars which did well are discussed in connection with an account of various races. Page 48.

French Locomotive With Free Piston Engine

Current pride of the French railroad is a locomotive which has a free-piston generator and gas turbine. Produced by Renault and requiring no electric or hydraulic transmission, its design details are analyzed here. Page 74.

50 New Product Items And Other High Spots, Such As:

Test cell protection at jet engine plant; high speed heating of spring, leaves; new GM intercity bus; determination of combustion products; 300-ton stretch press for Canberra production; radioisotope projects; huge Metal Congress and Show; and small Continental engines.

Automotive and Aviation News, Page 33
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AUTOMOTIVE INDUSTRIES COVERS
PASSENGER CARS • TRUCKS • BUSES • AIRCRAFT • TRACTORS • ENGINES • BODIES • TRAILERS • ROAD MACHINERY • FARM MACHINERY • PARTS AND COMPONENTS • ACCESSORIES • PRODUCTION EQUIPMENT • SERVICE EQUIPMENT • MAINTENANCE EQUIPMENT
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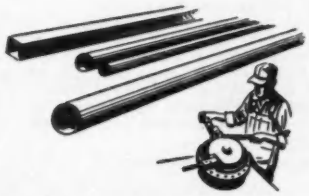
RYERSON

The Industrial P. A.'s Department Store

Here are a few of the many types of steel and related products on hand right now, ready for immediate shipment from your nearby Ryerson plant. Many may be used in place of products that are still hard to get. Check the items you need, and save time by ordering them next time you call Ryerson.

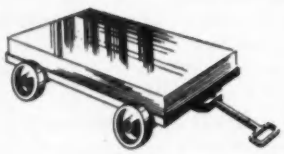
ALLOYS

Tested alloys of known hardenability, both standard and aircraft quality. Complete heat treatment guide with each shipment.



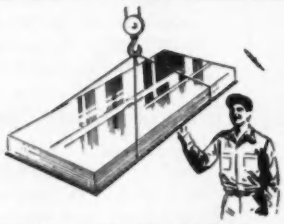
WELDED MECHANICAL TUBING

Hot and cold rolled, rounds and squares in a wide range of sizes. Consider cost. Substitute for seamless tubing.



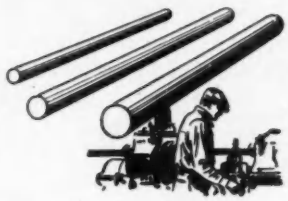
CARBON SHEETS

Both hot and cold rolled coming into better supply, especially cold rolled in the heavier gauges.



STRAIGHT CHROME STAINLESS

No allotment required for these stainless bars, plates and sheets—and they can often replace restricted nickel-bearing types.



TOOL STEEL

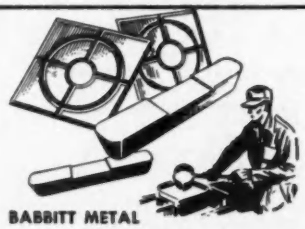
Water, oil or air hardening steel. High in quality; economical in price. Hardening data with every shipment.

SAFETY PLATE

Strong, non-skid Inland 4-Way Safety Plate protects feet against slipping, floors against wear. Easily fabricated.

CHAIN & WIRE ROPE

Rugged, dependable TM chain, iron, steel and alloy qualities, furnished to order. High quality wire rope shipped from large stocks.



BABBITT METAL

Glyco Babbitt, an exclusive Ryerson product, has physicals equal to high tin Babbitts; costs substantially less and is unrestricted.

RYERSON STEEL

JOSEPH T. RYERSON & SON, INC. — STEEL SERVICE PLANTS AT: NEW YORK • BOSTON • PHILADELPHIA • CINCINNATI • CLEVELAND DETROIT • PITTSBURGH • BUFFALO • CHICAGO • MILWAUKEE • ST. LOUIS • LOS ANGELES • SAN FRANCISCO • SEATTLE • SPOKANE

News of the AUTOMOTIVE AND AVIATION INDUSTRIES

Vol. 107, No. 8 October 15, 1952

TRANSPORTER

The T-10 Transporter carries the new 280 mm gun recently announced by the Ordnance Corps. Two 4 x 4 units independently powered by 375-hp Continental engines pick up and carry the gun mount, recoil mechanism and rifle between them. The front tractor unit has its cab forward and controls both power units when carrying the gun mount. Rear unit is similar but has its cab in the back. Kenworth Motor Truck Corp. produces the units which have special Timken axles, Allison torque converter. Weight is 85 tons, length is 84 ft.

Nash NXI to be Built in England

Nash Motor Div. has taken a major step toward the eventual production of its lighter NXI car exhibited two years ago. Negotiations between Nash and two British automotive firms have been completed for the production of the new car for distribution in the U. S. and Canada, George W. Mason, president and chairman of Nash-Kelvinator Corp. said last week.

Austin Motor Company, Ltd., and Fisher & Ludlow, Ltd., both of Birmingham, England, will produce the cars for Nash, he said. Fisher & Ludlow will build the bodies and Austin will provide the chassis and do the final assembly. These firms were selected after extensive study of European sources of mechanical and other components already tooled and thoroughly proved. Austin is the largest manufacturer of automobiles outside of the U. S. Fisher & Ludlow is a major body builder and a large producer of other metal products.

Changes made since the NXI was shown to the public include an increase in the wheel base to 85 in. and horsepower to 42, more seating capacity and styling improvement, Mason said. The new lighter car is designed to give up to 40 mpg at normal highway speeds.

The new lighter car will follow the monocoque construction principles inporporated in present lines. It will be sold and serviced by Nash dealers in the Uited States and Canada. The date for public introduction of the car has not been fixed, Mason said, but it will not be available for sale before the latter part of next year. He would not speculate on the possible selling price.

The Buick Skylark sports car will be produced in limited quantity for 1953, according to I. L. Wiles, Buick Motor Div. general manager. No selling price was announced, but Mr. Wiles indicated the special car is expected to sell for less than $6000.

General Announces Ultra-Low Pressure Tire

Announcement of a new ultra-low pressure automobile tire was made this month by the General Tire & Rubber Co.

Named the "Jumbo 14," this tire carries only 14 psi of air—compared to the standard low-pressure tire with 24 psi. The Jumbo was designed specifically for Ford and Chevrolet cars. The new tire is built wider at the rim, and tapers down to the narrow, conventional tread. In tests the tire has been driven into high curbs and deep chuck-holes at 70 mph without bruising or breaking.

General says the ultra-low pressure feature gives additional blowout and puncture protection, and reduces automobile repair bills by absorbing rough pavement and road vibration.

News of the AUTOMOTIVE

HENRY J AND KAISER FOR 1953

First new cars to be announced for 1953 are the Kaiser and Henry J. The Kaiser engine has new manifolds which give an increase of three hp to 118, and maximum torque increase of 10 ft lb to 200 at 1800 rpm. Smaller diameter shock absorbers with improved valving, spark plug caps, and balanced trunk hinges are other changes.

Styling features include new chrome trim around the headlights and under the side and rear windows, and a new hood ornament. The Henry J features water-proofed ignition cables, silicone lubrication for door locks, and a new rear bumper which extends the overall length about six in. to about 184 in. Engine outputs are unchanged.

Chrysler Names Woolson New DeSoto President

L. Irving Woolson has been elected president of DeSoto Motor Corp. to succeed C. E. Bleicher, who died Sept. 23. Mr. Woolson had been vice-president in charge of manufacturing and a member of the DeSoto board of directors. He has been associated with Chrysler Corp. more than 24 years, and with DeSoto since 1936. Since joining Chrysler in 1928 as a draftsman he has seen service in developing the first DeSoto engine, in coordinating engine and production activities at Dodge truck, as assistant chief engineer of Plymouth, and in various civilian and wartime engineering and manufacturing operations for DeSoto. He was made operating manager in 1948 and two years later was elected vice-president in charge of manufacturing and a director.

Willys Plans to Stay in Plane Parts Field

Willys-Overland is undertaking an airplane parts program which is intended to establish the company as an important aircraft industry supplier. Willys already is substantially involved in production of landing gears, jet engine components, aluminum forgings for aircraft, and electronic equipment. Ward M. Canaday, president, says that the automotive business will remain the company's principal objective but that expansion in the aircraft supplier field will continue.

N-K Adds Appliance Line

Nash-Kelvinator Corp. is expanding its line through purchase of a controlling interest in Altorfer Brothers Co. of Peoria, Ill., which produces laundry equipment. The acquisition will expand the company's appliance line to include automatic and conventional washing machines, ironers, and an automatic dryer. The Peoria company will be operated as an N-K subsidiary, with present management retained.

Two-thirds of New Cars Sold on Time Payments

Nearly 64 per cent of new car sales last year were on a time payment basis, the first time in history that the percentage of financed cars in the new car field was as high as those in used car transactions. The American Finance Conference reports that the uptrend in new car financing shows a sharp contrast to sales records in 1946, when only 42 per cent of new car sales were made on the installment plan. In that year 58 per cent of used car sales were on the time payment basis. Conclusion made by the Conference is that dealer advertising which emphasizes time sales plans will be of interest to two-thirds of all new and used car buyers and, if the present trend continues, to an even larger percentage in the future.

Goodyear to Operate Ohio Atomic Plant

The Goodyear Tire and Rubber Co. has been named to operate the Uranium-235 production plant to be built in Pike County, Ohio, by AEC. Goodyear will be the principal employer when the $1.219 billion facility is completed about four years from now and will have a permanent working force of about 4000 persons.

Individual units of the gaseous diffusion plant will be put into operation as they are completed and limited hiring of personnel will begin early next year to provide extensive training for all operating employees. Union Carbide and Carbon Corp., which operates the atomic energy plants at Oak Ridge, Tenn., and Paducah, Ky., will help train key personnel employed by Goodyear and will render other assistance.

Fisher Testing Plastic Dies

Fisher Body Div. is reported to be starting production of car doors using plastic dies. There is no official comment on it from Fisher, but it is understood that doors to be made on the dies are for a low volume run, possibly for a sports car.

Truckers Prefer Red

Analysis of current buyer preferences showed that 29.5 per cent of the International Harvester Co. motor truck production was painted red.

AND AVIATION INDUSTRIES

K-F Planning Plastic Sports Car as Test

Kaiser-Frazer Corp., is going to test the sports car market with about 1100 units built with plastic bodies. Edgar F. Kaiser, president, says that production will begin in about nine months on a three-passenger sports car built on a Henry J chassis with six-cyl engine. The car will weigh about 2000 lb and probably will sell for approximately $2000. The bodies, made of laminated fibre glass construction, will be built by a supplier and will enable K-F to test the market without a large investment in dies. If the model proves successful, the company may later go into a steel version, as there is no known way to mass-produce glass bodies at this time, Mr. Kaiser said.

The car will be styled by Howard Darrin in conjunction with the Glasspar Co. in California, and will have the low rakish lines of the European sports cars. Wire wheels are not contemplated, since they would add about $200 to the cost, but may be offered as optional equipment.

Engineer Shortage Discussed

Only two-thirds as many engineers will graduate in the next few years as could be placed in industry. This figure came out at the sixth annual conference on administration of research, held at Georgia Institute of Technology last month.

Speakers agreed that this shortage of trained research personnel was the main problem in greater research efforts. Their data indicated that in 1953 about 22,000 engineers will be graduated, with about 20,000 in 1954 and 1955. Industry and Government laboratories will need at least 30,000 new engineers annually, it was stated.

Rebuilding Army Trucks

ACF-Brill Motors Co. has received over $3.3 million in government contracts, it was announced recently. The major part of the contracts is an order to remanufacture a large quantity of 2½-ton 6 x 6 motor trucks authorized by the Philadelphia Ordnance District. The balance of the order is for two types of trailers.

OLDS ROCKET ASSEMBLY

Women employees at the Oldsmobile plant in Lansing, Mich., are shown putting together tail assemblies of 3.5 in. rockets. The wire is riveted to the contactor ring, and the support ring is welded to the aluminum fins and nozzle.

Ford Denies Stock Sale Contemplated

Ford Motor Co. has emphatically denied that there are any immediate plans to offer Ford stock to the public. A recent newspaper article had indicated that such a move was contemplated, based on a statement credited to Paul Hoffman, president of the Ford Foundation, that diversification of assets of the Foundation was under consideration. The Ford Foundation currently holds 3,089,908 shares of Class B, non-voting, Ford stock as its principal asset and source of income.

August Car Registrations Lowest in Five Years

August registrations of new cars and trucks dropped to the lowest point in several years as a result of the steel strike, according to R. L. Polk & Co. New passenger car registrations fell to about 214,000, according to preliminary estimates, the lowest since February, 1947, reflecting the lack of production during June and July. New truck registrations also showed a sharp decline to around 58,000 units, a sizeable drop from July, when 72,134 units were registered.

Belt Conveyor Proposed for Cleveland Transit

Construction of a belt conveyor passenger subway underneath Euclid Ave., in downtown Cleveland, O., has been recommended to the city by the Cleveland Transit System. Cost of the conveyor system, designed by the Goodyear Tire and Rubber Co., was estimated to be only a little more than half that of a proposed conventional transit loop for Cleveland's downtown section.

The 3300-ft subway would use the same type of conveyor belt equipment designed by Goodyear for the Grand Central-Times Square subway shuttle in New York City but would incorporate two intermediate stops. The design calls for the use of small passenger cars riding on high speed main conveyor belts and slow speed belts at loading and unloading points.

Automobile Oldtimers to Honor Six Veterans

The Automobile Oldtimers will present distinguished service awards at its annual dinner in New York Thursday, Nov. 13, to six men long associated with the automotive industry. They are: John L. Collyer, chairman and president of B. F. Goodrich Co.; Geo. W. Mason, chairman and president of Nash-Kelvinator Corp. and president of AMA; Col. Willard F. Rockwell, chairman of Timken-Detroit Axle Co., Standard Steel Spring Co., and Rockwell Manufacturing Co.; Russel E. Singer executive vice president of the AAA; John J. Schumann, Jr., president of General Motors Acceptance Corp., and Albert L. Pope, who was president of Pope Manufacturing Co.

Latin American Market

The Mexican Automobile Association has released a study revealing that the Latin American market is the most important for motor vehicles exported from the United States. During 1951, the 33 countries of Central and South America imported 253,061 units, or 58 per cent of total exports which came to 434,679 units. Cuba, Mexico and Brazil were the top three importers.

News of the AUTOMOTIVE

TWO FLYWEIGHTS

The XH-26 pulse-jet helicopter demonstrated recently weighs only 300 lb empty, will lift a 600-lb load. Collapsible, the ship can be reassembled in 20 min. Engines have only one moving part, a valve whose life has been extended to 50 hr. American Helicopter Co. at Manhattan Beach, Calif., is developing it for the Army.

This single-place all-metal light plane weighs 610 lb empty, will cruise at 110 mph. Power is by a 65-hp Continental engine. Called the Honey Bee, it was flight-tested only 60 working days after its inception, according to Beecraft Associates, Inc., of San Diego, Calif. Firm's Wee Bee was world's smallest plane two years ago.

Turboprop Transport to be Produced

Lockheed Aircraft Corp.'s Georgia division will produce a new Lockheed turboprop transport airplane for the Air Force, the company announced recently. Prototypes of the new plane, a medium cargo transport designated the C-130, are now being built in Burbank, California. Production orders for the plane came before completion and flight test of the developmental models.

Quantities to be built at the Marietta, Ga., plant are secret, but company officials said that initial orders cover buildup of assembly lines and tooling for quantity production. Lockheed is now building B-47 jet bombers at the Marietta facility, the second largest aircraft plant under one roof in the world. The 3000-acre installation was reactivated by Lockheed nearly two years ago for de-mothballing and modification of B-29 bombers. Employment at the Georgia division now totals about 11,500.

Powered by four Allison turboprop engines, the C-130 will be the nation's first transport designed from the outset for turboprop power. Distinguished by its low-slung and highly utilitarian fuselage, the C-130 incorporates truck-bed level loading, integral loading ramp, a full rear opening for air drops and a pressurized cabin. The cargo floor stands only 45 in. from the runway.

AIEE Program Announced

The program of meetings and plant tours for the fifth annual AIEE Special Conference on Machine Tools has been announced. The conference is to be held Oct. 29-31 at the Hotel Ten Eyck, Albany, N. Y. Registration begins in the morning of Oct. 29. Afternoon papers will cover the subject of electric drives for various machines and applications. Dinner speaker will be Tell Berna, general manager of the NMTBA, who returned recently from a European tour of machine tool builders.

Electrical safety controls will be the topic for the morning of Oct. 30, and the luncheon speaker will be H. A. Winne, vice-president in charge of engineering policy at the General Electric Co. Afternoon speakers will discuss tests of control relays, control by a digital computer, induction motor duty cycle applications, and electric gaging. For Oct. 31, trips are scheduled to the Watervliet Arsenal, American Locomotive Co., and General Electric Co.

Buick, Studebaker Begin Jet Engine Deliveries

First shipments of jet engines were announced last month by two automobile makers, Buick Motor Div. of General Motors Corp., and Studebaker Corp.

A pilot model of the Wright J-65 Sapphire was delivered by Buick to the Air Force for testing. A spokesman said the company expected to meet production schedules.

Studebaker announced it has made its first delivery of General Electric J-47 jet engines from the South Bend, Ind., engine plant. Small parts are made at the New Brunswick, N. J., plant, while the government-owned Chicago, Ill., plant operated by Studebaker during the last war is used for machining larger parts such as the turbine shaft.

Chevrolet Official on Rhodes Scholar Panel

For the first time in history, an automobile company representative has been named to a panel to select winners of Rhodes scholarships to Oxford University in England. He is T. O. McLaughlin, who is head of the Chevrolet dealer sons' school which he organized in 1938.

AND AVIATION INDUSTRIES

Inco Holds Ductile Iron Demonstration for Press

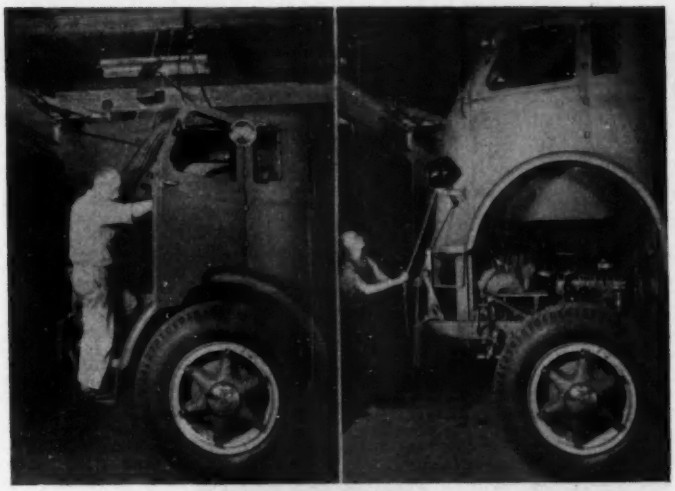
The notable qualities of ductile iron as an engineering material and its growing applications were graphically demonstrated at a recent showing for the technical trade press held by International Nickel Co. at its Bayonne, N. J., Research Laboratory. Some 50 or more guest editors first witnessed a series of tests designed to prove the strength of ductile iron under various stresses and strains.

On display in a specially erected tent were numerous displays of equipment incorporating ductile iron castings. Among the automotive parts shown were: digger blades and sprockets on a Ford trench hog; marine gear; clutch adjusting nut; crankshaft for a Le Roi truck engine; piston rings; hub and brake drum; camshaft; Borg-Warner clutch drive ring; certain components on a DoAll band saw; and the outer ring of main bearing support for a Sapphire jet engine.

After watching the pouring of a cupola in the Laboratory's experimental foundry and examining some castings in the mill bay, the group listened to a luncheon discussion by members of the Company's staff on the development of ductile iron and its assets from the standpoints of strength, durability, versatility, adaptability, favorable cost factors, etc. While first announced only a little over three years ago, the output of ductile iron has risen steadily and is expected to reach 80,000 to 100,000 melt tons in 1952. Nearly 200 firms throughout the world have been licensed to use the process.

Ore Stockpile Growing Faster than Expected

Steel companies are cautiously optimistic that enough iron ore will be stock-piled before the close of the shipping season to insure continued operation of mills through the winter season. Ore shipments are catching up much faster than had been expected and are reducing the deficit resulting from the 55-day steel and iron ore workers strike. United States Steel reports that its stockpile is within two weeks shipments of the reserve it had at this time last year. More ore boats, heavier loading allowed because of the higher water levels this year, and heavier rail shipments are contributing to the improved ore reserve situation.



REMOVABLE CAB

A cab demountable in 10 min has been brought out by Autocar Co. for its engine-under-seat models. Hold-down bolts are easily accessible. Wiring can be disconnected at plugs, pipes at unions. Brake and accelerator pedals are mounted permanently on the floor, which remains in place as part of the chassis. Water connections do not have to be disturbed. Minor repairs are made by moving seats.

Electric Furnace Co. Incorporates in Canada

The Electric Furnace Co., of Salem, O., announces the incorporation of a subsidiary company in Canada to be known as Canefco Limited with headquarters at 137 Wellington St., West, Toronto 1, Ont.

The officers of this new Canadian company are D. E. Moody, president, K. U. Wirtz, vice-president, and H. E. Farintosh, secretary-treasurer. Wirtz is also president of the Electric Furnace Co., with which company he has been associated for over 25 years. Canefco Limited will design, erect, and put into operation both fuel fired and electrically heated industrial heat treating furnaces, special atmosphere generators, charging machines, and other auxiliary equipment in collaboration with the parent company.

Reynolds Plant Output Boosted

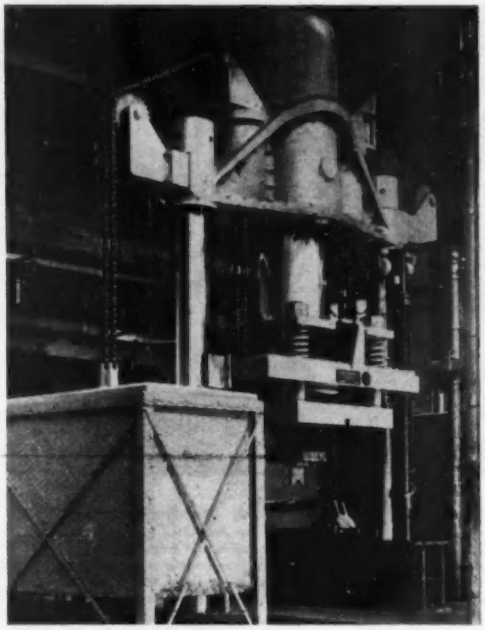
The Reynolds Metals Co. has increased the capacity of its plant at Longview, Wash., from 60 million to 100 million lb of pig aluminum per year, while maintaining aluminum production. A recent announcement states the expansion was accomplished by enlarging the plant's 372 reduction pots — electrolytic cells where alumina becomes metallic aluminum.

The pot structures were trucked individually to a firm for fabrication, where they were cut in two and expanded by welding in joining sections.

Truckstell Expands

Expansion of the Truckstell Manufacturing Co. was announced recently. Plant and machinery facilities have been increased to double the present capacity of the plant at Townsend, Mass., where Truckstell manufactures dual axle drives.

News of the AUTOMOTIVE



PROOF TEST

A 600,000 lb machine for testing landing gear has concrete counterweights instead of hydraulic cylinders, to duplicate the action of single-ram machines for load holding and instantaneous return. Load can be applied at 0-6 ipm and approach speed is 0-30 ipm. Clear space is 6 x 6 ft. Manasco Mfg. Co. ordered the tester from Baldwin-Lima-Hamilton Corp.

1952 U. S. PASSENGER CAR PRODUCTION

(As reported by the car factories)

	September 1952	August 1952	September 1951	Nine Months 1952	Nine Months 1951
Chrysler	3,398	5,563	10,326	60,985	129,989
De Soto	9,473	4,327	8,956	68,577	94,936
Dodge	20,003	11,497	20,925	172,317	258,047
Plymouth	52,443	21,294	38,191	332,899	507,031
Total—Chrysler Group	85,317	42,901	78,398	654,778	990,005
Ford	81,711	47,404	56,216	510,470	719,366
Lincoln	4,125	2,133	1,943	24,979	10,855
Mercury	15,099	13,489	16,594	126,718	188,189
Total—Ford Group	100,935	63,026	74,753	662,175	918,412
Buick	34,342	20,140	30,053	227,110	323,161
Cadillac	9,816	9,367	7,763	73,824	81,942
Chevrolet	100,241	42,310	76,179	626,441	892,916
Oldsmobile	24,536	14,228	20,213	167,228	228,034
Pontiac	29,539	17,026	23,647	201,386	274,605
Total—G. M. Group	198,475	103,077	161,755	1,305,999	1,800,598
Kaiser-Frazer Group	6,966	5,754	4,612	50,816	85,737
Hudson	6,761	5,986	3,447	63,971	81,259
Nash	17,843	9,903	13,799	101,948	127,259
Packard	5,796	2,825	4,454	44,220	60,133
Studebaker	14,277	4,634	16,881	111,036	179,383
Willys	5,776	1,763	1,786	38,133	22,859
Total—All Makes	441,816	236,871	350,883	3,035,976	4,284,436

E. W. Bliss to Build Giant Forging Presses

E. W. Bliss Co. has contracted to build two giant forging presses for Kaiser Aluminum and Chemical Co. The new presses, which have a capacity of 25,000 tons and 35,000 tons respectively, are the largest ever to be built in this country and will be used for production of jet aircraft components. Cost of the presses is estimated at $6 million each and will be borne by the Air Force.

They are scheduled to be used at a new Kaiser plant now being built in Newark, O. The smaller of the two presses will be completed before the end of next year, and the larger one is scheduled for 1954.

New Plastics Plant

The Swedlow Plastics Co., leading producers of transparent plastic enclosures for aircraft and pioneers in acrylic fabrication, announced the opening of their third manufacturing facility at Los Angeles, Calif., last month.

This new 37,000 sq ft plant, brings Swedlow's manufacturing facilities to a total of over 70,000 sq ft in that area. It also contains the general offices of the company. Swedlow also operates a Youngstown, O., division.

Swedlow facilities are devoted principally to the manufacture of low and intermediate pressure laminates and custom fabrication of sheet plastics, specializing in aircraft glazing applications and a wide variety of other industrial needs.

New Fastener for Metal

A metal fastener originally developed to help keep ice off airplanes is now being used in automobile production. It's called Rivnut—a rivet developed by the B. F. Goodrich Co. and long used for fastening inflatable de-icers to airplane wings because it can be expanded to form a tight seal. Now Pontiac engineers have found them the answer to making a leakproof connection for two light metals and will use them to fasten sun visors on the 1953 Pontiac cars. An extra virtue is that the metal fasteners can be installed after painting.

AND AVIATION INDUSTRIES

Hart Pressed Steel Sold to Chicagoan

Sale of the Hart Pressed Steel Corp., Elkhart, Ind., to Thur Schmidt of Chicago, was announced last week, by the owner, Frank E. Hartnell.

Schmidt has incorporated the firm under the new name, Hart Metal Products Corp. He said the company will continue to make metal parts for trucks, busses, house trailers and aircraft. The company also is engaged in filling several defense sub-contracts for the aircraft industry.

Hartnell, who is disposing of the plant to devote more time to his manufacturing interests in Mexico and South America, will serve as a consultant to the new owner. Schmidt, 37, has been director of research and development and assistant to the president of Ingersoll Products division of the Borg-Warner Corp. in Chicago, Ill.

The Hart company was organized in June 1940. It has grown from 14 to 200 employees. In 1951, the company added facilities to make aircraft metal fabrication and sub-assemblies for the B-47 bomber and the F-86 Sabrejet.

Cold Extrusion Plant for Commercial Work

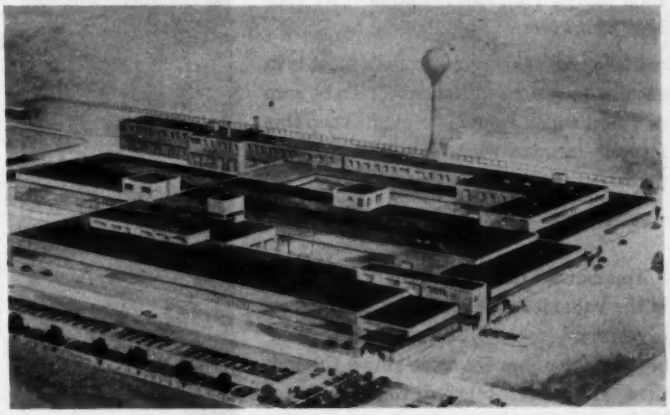
Mullins Manufacturing Corp. announces that it will establish the world's first plant for the cold extrusion of commercial items in steel under its "Koldflo" process. Cost of the new facility, to be part of its main Warren, O., plant will be $2.6 million.

Mullins already holds a substantial order from a manufacturer of parts for trucks and other heavy vehicles. Other orders are being negotiated, a spokesman said, with firms that want extruded parts, but lack the equipment to make them in their own shops.

Mullins' Koldflo Div., as the new facility will be called, will occupy the part of the Warren plant where the cold extrusion process was developed. In addition to the two 2000-ton presses already installed there, Mullins will buy four more 3000-ton presses with 36-in. strokes. This equipment will enable the division to cold extrude steel products up to 30 in. long and weighing 50 lb. A building with 20,000 sq ft of floor space will be erected adjacent to the main building to house bonderizing, pickling, annealing, and sawing equipment needed in the process.

Mullins already has a cold extrusion operation for the military, producing shells for 105 mm artillery and for mortars.

(*Turn to page* 160, *please*)



I-H LABORATORIES

International Harvester Co. last month dedicated its new $8 million motor truck engineering and research laboratories at Fort Wayne, Ind. With over 300,000 sq ft of floor space, the entire building is air conditioned or ventilated with a forced air system. Engine testing is accomplished in 30 test cells, with a total of 30 dynamometers; 12 are for endurance testing, while 18 are used in engine development.

1952 MOTOR VEHICLE FACTORY SALES*

	Passenger Cars	Trucks	Buses	Totals 1952	Totals 1951
January	273,539	100,993	778	375,410	606,533
February	334,088	100,533	623	435,216	610,321
March	373,237	109,167	589	482,973	758,022
April	416,185	112,833	997	529,585	630,272
May	396,296	105,208	423	502,917	662,727
June	408,700	109,526	484	518,710	617,685
July	168,327	43,343	224	211,894	492,316
August	218,577	52,056	349	270,982	549,707
Total—Eight Months	2,390,979	733,699	4,049	3,329,687	4,931,883

1952 MOTOR TRUCK FACTORY SALES BY G.V.W.*

	5,000 lb. and less	5,001–10,000	10,001–14,000	14,001–16,000	16,001–19,500	19,501–26,000	Over 26,000	Total
January	35,060	17,832	5,914	22,409	6,388	9,176	4,234	100,993
February	34,282	16,114	6,251	23,278	5,149	9,132	4,327	100,533
March	38,715	19,452	5,657	24,347	5,992	10,076	5,028	109,167
April	43,383	22,313	5,670	21,959	4,604	10,062	4,832	112,833
May	39,560	22,934	5,678	19,243	4,326	10,033	3,434	105,208
June	43,388	23,755	5,373	19,994	4,242	8,964	3,810	109,526
July	15,950	8,530	1,897	7,010	1,502	5,099	3,355	43,343
August	22,761	9,363	2,057	7,822	1,362	6,177	2,724	52,056
Total—8 Mos. 1952	273,109	142,293	36,497	145,862	33,235	68,689	31,774	733,699
Total—8 Mos. 1951	435,038	188,891	74,847	191,074	48,439	53,145	27,396	1,018,828

*—Automobile Manufacturers Association.

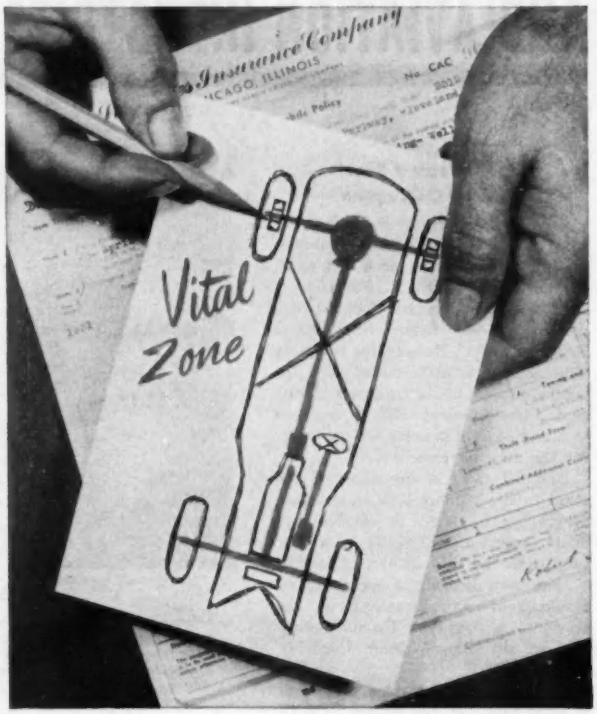
. . . but your best insurance is value

HOW LONG a car will keep its buyer happy—and "sold"—with trouble-free performance is determined by the *value* built into it. That's what makes value your best insurance.

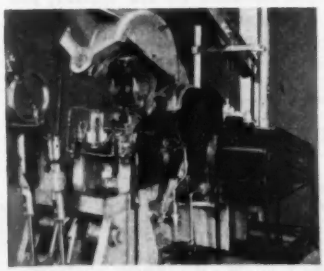
The place where value counts most is in moving parts, the "vital zone". To be sure of "vital zone" value, you might keep this formula in mind when buying component parts:

$$Value = \frac{quality + service + public\ acceptance}{price}$$

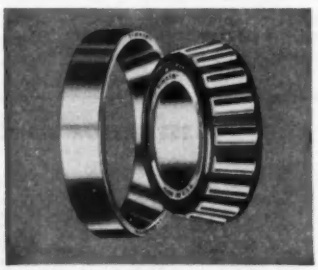
You can see that price is only *one* factor in the value formula and must be weighed in relation to factors *above* the line. Timken® bearings give you far more above the line than any other tapered roller bearing. Higher quality, better service and wider public acceptance. And in terms of value features, Timken bearing prices are lower today than ever. The Timken Roller Bearing Company, Canton 6, Ohio.



How TIMKEN® bearings give you value where it counts most . . . in the "vital zone":



ROLLER TESTING MACHINE in The Timken Company's physical laboratory tests different steels for durability to rolling fatigue. It's typical of our vast testing and research facilities that are constantly at work to develop better bearings and related parts.



PREFERRED FOR PINIONS. All but two makes of cars use Timken bearings on the pinion, toughest automotive bearing application. And in other "vital zone" points—wheels, differentials and steering gears—Timken bearings give dependable, friction-free operation.

ONLY TIMKEN BEARINGS GIVE YOU ALL THESE VALUE FEATURES

QUALITY

1. Design leadership
2. Steel made in our own mill
3. Precision manufacture
4. Rigid quality control
5. More than 50 years' experience

SERVICE

6. Unequalled engineering service
7. Unequalled research and development facilities for your use
8. Installation service in the field
9. Widest range of sizes
10. Most dependable source of supply

PUBLIC ACCEPTANCE

11. First choice throughout industry
12. Best-known name in bearings
13. Widespread advertising

it's TIMKEN for VALUE

TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

NOT JUST A BALL ◯ NOT JUST A ROLLER ⊂⊃ THE TIMKEN TAPERED ROLLER ⊂⊃ BEARING TAKES RADIAL ◯ AND THRUST →◯← LOADS OR ANY COMBINATION →✳←

Men in the News

Current Personnel Appointments and Changes at Plants of Automotive Manufacturers and Their Suppliers

American Chemical Paint Co.—G. H. Williamson is head of the company's new Niles, Calif., plant.

Goodyear Atomic Corp.—Albert J. Gracia will manage this new subsidiary of the tire company in Southern Ohio.

Houdaille - Hershey Corp. — Earl F. Riopelle has been appointed to the newly-created position of manager of engineering.

Critchfield & Co.—Leon G. Wilcox was named vice-president recently, specializing in industrial advertising.

Cummins Engine Co.—C. R. Boll, Jr., is now general sales manager.

DeSoto Div. of Chrysler Corp. — **L. I. Woolson** was elected president to succeed **C. E. Bleicher** (see Necrology).

Aeroquip Corp.—**George J. Fischer** joined recently as general sales manager. **Matthew J. Betley** is the new works manager.

Carborundum Co.—**Fred W. Scott, Jr.,** has been named manager of the newly established merchandising sales division.

Firestone Steel Products Co.—**George B. Moseley** was named general sales manager recently.

Pratt & Whitney Aircraft Div. of United Aircraft Corp.—**Henry J. Fischbeck** was named staff metallurgist in the advanced tool engineering group recently.

Pontiac Motor Div. of General Motors Corp.—Appointed as assistant to the general sales manager was **Ralph W. Leighton,** succeeding **Walter I. Gibson,** who has retired.

Boeing Airplane Co.—**W. W. Rutledge** was named to the newly created post of operations manager at the Wichita, Kan., plant. **T. C. Pitts** is the new factory manager and **Ernie Ochel** replaces him as general superintendent.

Goodyear Aircraft Corp.—**Val Follo** was named factory manager recently.

Willys-Overland Motors, Inc.—**Denton Massey,** former Canadian member of Parliament, has joined W-O Export Corp. as general manager of European operations.

Studebaker Corp. — **Harold E. Churchill** was recently elected vice-president-engineering, and chairman of a new operating committee composed of **E. J. Hardig,** who will become chief passenger car engineer; **W. W. Smith,** chief administrative engineer; **A. G. Laas,** chief product engineer; **R. E. MacKenzie,** chief truck engineer; and **M. P. deBlumenthal,** chief research engineer.

Firestone Tire & Rubber Co., World Bestos Div.—**William J. Nanfeldt** is now general manager, and **William F. Rogge** is general sales manager.

Eaton Manufacturing Co., Axle Div. —**John Davies** was appointed assistant chief engineer recently.

Budd Co.—**Edward W. Jackson** was recently appointed assistant works manager of the Charlevoix (Detroit) plant. **Donald MacDonald** was named credit manager of the plant to succeed **John A. Markley,** who has retired.

Chrysler Corp. — Recently elected vice-presidents were **Carl J. Snyder,** corporation operating manager; **Robert W. Conder,** director of industrial relations; and **James Cope,** assistant to the president.

B. F. Goodrich Co.—**Arthur Kelly** will become vice-president-manufacturing on Jan. 31, 1953, when **Thornton G. Graham** will retire.

Consolidated Vultee Aircraft Corp., Guided Missile Div.—**Charles D. Perrine, Jr.,** was named assistant division manager recently.

(*Turn to page* 156, *please*)

Necrology

Clarence E. Bleicher, 62, president and general manager of the DeSoto Div. of Chrysler Corp., died at Detroit, Mich., of a heart attack on Sept. 23.

Henry M. Dawes, 75, executive committee chairman of the Pure Oil Co. and former company president, died at Evanston, Ill., on Sept. 29.

William J. Baxter, 72, pioneer automobile sales executive and member of the Chrysler Corp. New York offices, died in that city on Sept. 22.

John R. Cobb, 52, British holder of the world's automobile speed record, was killed in his boat during a record attempt on Loch Ness, Scotland, on Sept. 29.

New Fiber Sheet

solves sealing problems

Armstrong's Accopac® is a brand-new gasket material with many advantages over conventional fiber sheets. Its unique fiber, cork, and latex composition gives it exceptional sealing qualities.

HIGHLY COMPRESSIBLE. Its high cork content gives Accopac high compressibility. Thus it seals equally well on light or heavy flanges. On light stampings, it conforms to normal irregularities without distorting the flange between bolts. On rough, heavy flanges, it fills surface imperfections to give a tight, dependable seal.

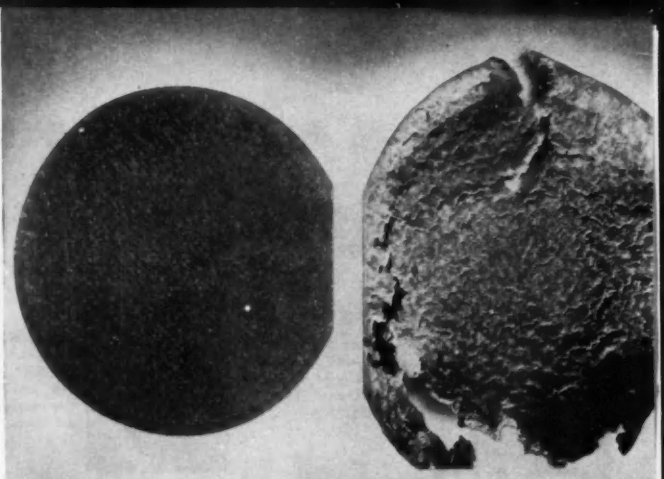
HIGH CRUSH RESISTANCE. Accopac's uniform composition gives it great crush strength. It will withstand loads of 100,000 p.s.i. without damage. That gives Accopac a greater resistance to the extreme bolting pressures easily built up at local points.

FIBERS LOCKED IN RUBBER. Each fiber and cork particle is locked in an even coat of latex. This is made possible only by Armstrong's patented modification of the beater saturation process. This permits the use of more saturant than ever before possible. And it gives a tighter, stronger, more uniform material.

CAN BE STORED FOR MONTHS. The photos on the right show Accopac's outstanding crush resistance and stability. Since humidity changes affect it very little, it can be stored for long periods without loss of sealing efficiency.

FIELD TESTED. Before being marketed, Accopac was field tested for more than 18 months. Industrial and automotive users who cooperated in putting it to a wide range of tests were enthusiastic over its performance.

GET SAMPLES TODAY. Accopac comes in sheets, rolls, ribbons, or die-cut shapes. Get samples for your own testing. Call your Armstrong representative or write to Armstrong Cork Co., 5810 Arch Street, Lancaster, Pa. Available for export.

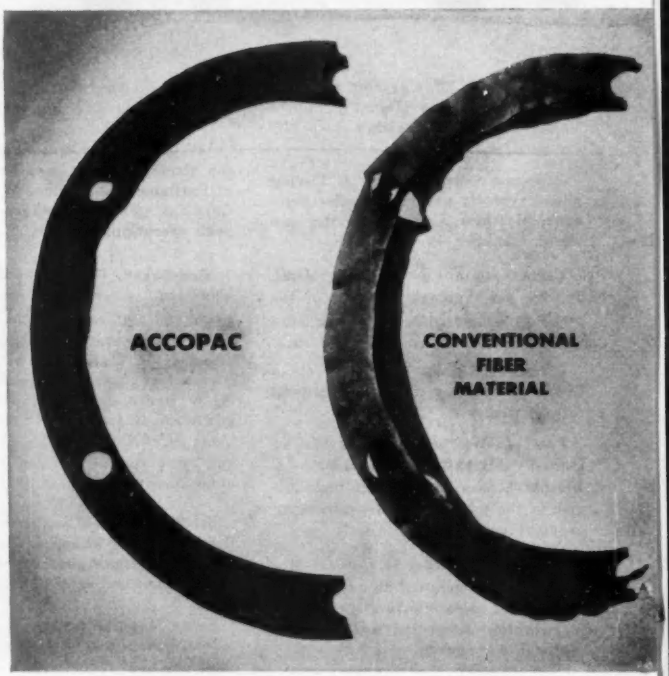


CRUSH TEST

Accopac after sustaining test pressure of 100,000 p.s.i.

Conventional fiber gasket ruptures at only 25,000 p.s.i.

RESISTS CRUSHING PRESSURE OF 100,000 P.S.I. Accopac resists 4 times as much crushing pressure as ordinary fiber materials. Crush resistance is important on light as well as heavy flanges. Even on relatively light joints, high spots or lack of parallelism can concentrate much of the bolting pressure on small areas of the gasket.



NEVER SHRINKS OR DRIES OUT. These two gaskets were used for 6 months in a gear pump circulating hot oil. The conventional gasket lost its glycerine plasticizer, dried out, shrank, and began leaking. The Accopac gasket was virtually unaffected, still provided an effective seal.

ARMSTRONG'S ACCOPAC

New floating anchor nut by ESNA

TYPE A-41

Type A-41 has same overall dimensions as standard ESNA anchor nut type A-1.

Offset basket design prevents rivet head interference with floating action of nut

Here is the finest floating anchor nut ever developed —ESNA's type A-41.

Consider these design advantages:

1. Envelope dimensions held within limits of AN366.

2. Simplified anchor nut installation methods make cost savings possible. Nut "float" eliminates costly lining-up operations often necessary to accurately install one piece anchor nuts.

3. Offset basket design prevents nut float restriction due to rivet head interference.

4. Approximately thirty percent lighter than previous basket type nuts.

5. The red elastic collar. The self-locking nut principle proved by over twenty years of aircraft usage and billions of installations.

Floating basket nuts are also available in other configurations.

LOOK TO ESNA for self-locking fasteners that cut assembly costs and save weight. Mail coupon for design information.

ELASTIC STOP NUT CORPORATION OF AMERICA IS ALSO MAKER OF THE ROLLPIN

Dept. N25-105, Elastic Stop Nut Corporation of America
2330 Vauxhall Road, Union, N. J.

Please send me the following free information:

- ☐ Drawing of type A-41
- ☐ Elastic Stop Nut Bulletin
- ☐ Rollpin Bulletin
- ☐ Here is a drawing of our product. What self-locking fastener do you suggest?

Name _____ Title _____

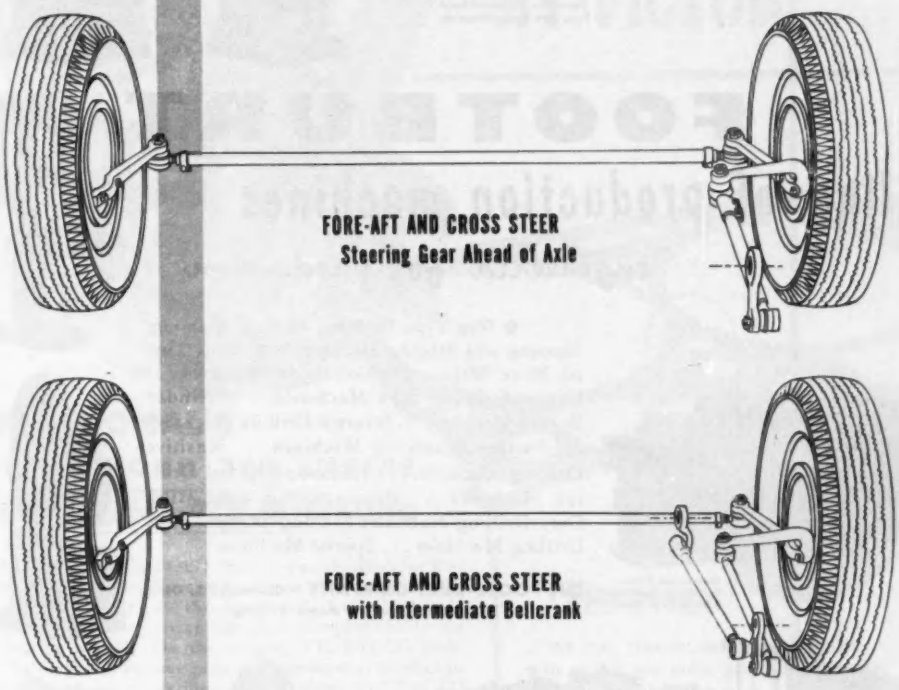
Firm _____

Street _____

City _____ Zone _____ State _____

Put your spring problems in our hands . . . .
WALLACE BARNES COMPANY
Bristol, Connecticut
THE WILLIAM D. GIBSON COMPANY
1800 Clybourn Avenue
Chicago 14
RAYMOND MANUFACTURING CO.
Corry, Pennsylvania
BARNES-GIBSON-RAYMOND
40300 Plymouth Rd.
Plymouth, Mich.
B•G•R
COOK PLANT
Ann Arbor, Michigan
F. N. MANROSS AND SONS CO.
Bristol, Connecticut
OHIO DIV.
Associated Spring Corporation
1712 East First Street
Dayton, Ohio
DUNBAR BROS. COMPANY
Bristol, Connecticut
MILWAUKEE DIV.
Associated Spring Corporation
341 East Erie Street
Milwaukee, Wisconsin
THE WALLACE BARNES COMPANY LTD.
Hamilton, Ont., Canada
ANY SIZE SHAPE QUANTITY
top 10 SOURCES for Mechanical Springs
Divisions of Associated Spring Corporation
and Canadian Affiliate

Engineered Steering for Trucks



STEERING LINKAGE must be developed to meet the requirements of many different truck designs. Thompson's "Steering Engineers" have worked closely with truck builders for over 35 years to improve steering.

With the accent on easy steering, design advances, road speed and increased loads on the suspension and linkage; steering linkage units are required to provide more strength and accuracy and greater freedom of movement at the sockets.

Improvements in modern trucks—with many additional requirements set up by the manufacturer for military and other "off-the-road" vehicles such as four-wheel steer, etc., as well as standard commercial models—necessitated better and far more complicated steering units.

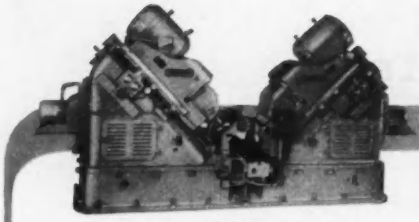
Illustrated are 2 of the types of steering linkage found on current-model trucks. The Detroit Division of Thompson Products has many other variations of steering units designed for truck use. We welcome the opportunity of submitting them for your examination. Please contact us.

YOU CAN COUNT ON . . .

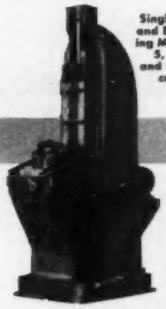
Thompson Products, Inc.

DETROIT DIVISION

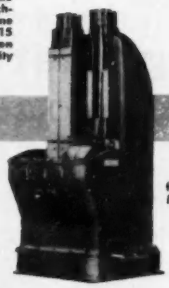
7821 CONANT AVENUE • DETROIT 11, MICHIGAN



Two-Way Hydraulic Feed Vee Type Stub Boring Machine



Single Slide and Broaching Machine 5, 10, 15 and 25 Ton capacity



Duplex Surface Broaching Machine 5, 10, 15 and 25 ton capacity

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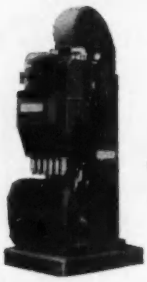
1, 2, 3, 4 and 6 Spindle Sensitive Drilling Machines

● Way Type Drilling, Boring, Reaming, Tapping and Milling Machines with One, Two or More Ways . . . Station Type Machines . . . Center Column Type Machines . . . Cylinder Boring Machines . . . Inverted Drilling Machines . . . Surface Broaching Machines . . . Sensitive Drilling Machines . . . Hammond Radial Drilling Machines . . . Manufacturing Type High Duty Drilling Machines . . . Independent Feed Drilling Machines . . . Special Machines.

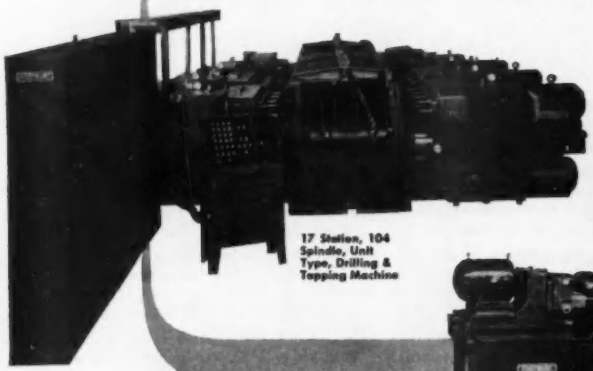
Continuous Type Broaching Machine Built in Four Sizes



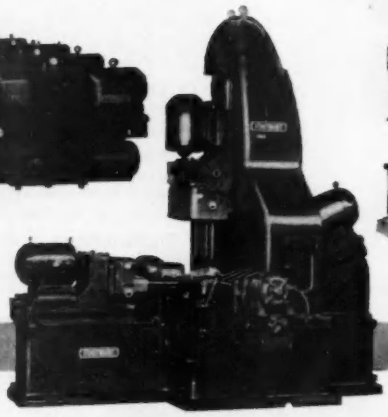
Stub Type Cylinder Boring Machines

THE FOOTE-BURT COMPANY • Cleveland 8, Ohio

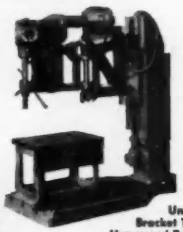
Detroit Office: General Motors Building



17 Station, 104 Spindle, Unit Type, Drilling & Tapping Machine



Five Way 21 Spindle Lead Screw Tapping Machine



Unique Bracket Type Hammond Radial Drilling and Tapping Machine

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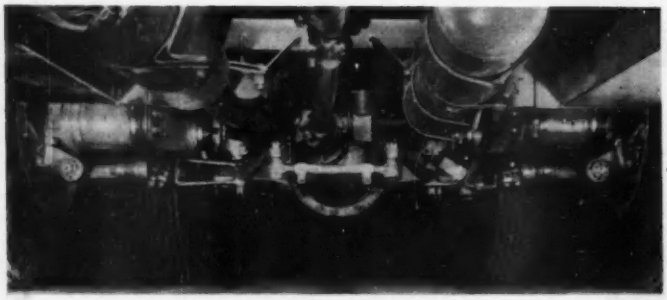
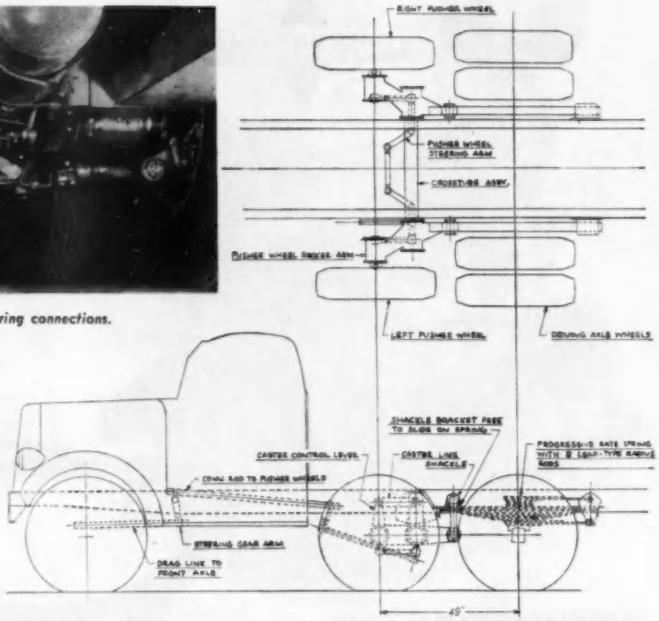


Underside view of the new pusher axle and steering connections.



This diagram shows arrangement of the White tractor with steering auxiliary axle.

White Introduces Steering Pusher Axle

A NEW steering pusher axle with important payload and load tolerance advantages for tractors in highway transport service has been introduced by the White Motor Co. It is presently available for the 24 and 22PLT models; and conversion kits for the 3000 series are under development.

Weight of the new unit with 10.00-20 tires is 1350 lb. It is independently mounted ahead of the driving axle and consists of a light-weight, single-wheel axle equipped with steering knuckles at each wheel. The wheels are steered through a drag link and tie rod coordinated with the steering of the front axle, and arranged so that the ratio of angle of turn between the tractor front wheels and pusher axle wheels is 3 to 1.

The fifth wheel can be located eight inches behind the center of the two axles of the tractor and still have excellent steering control with the steering pusher. This provides interchangeability with all trailers and is in contrast to the regular tandem tractor where the fifth wheel must be located up to 15 in. ahead of center line to maintain steering ability. For regular tandem tractors the landing gear must be located 22 in. further back on trailers, precluding possibility of coupling many existing trailers.

Other advantages of the steering pusher come from the safety and roadability features of twin steering. Over-the-road tests are said to indicate that the additional road stability of the steering pusher helps driving. Longer tire life is also made possible because of the reduced tire scuffing and dragging.

A third axle is added to the tractor so that the legal allowable load in most states on the driving axle and the steering pusher is 27,000 lb rather than 18,000 lb for the tractor with single driving axle. And because of the design features of the unit in White payload tractors, it permits trailer interchangeability and use of all existing trailers even with landing gear only eight feet from front of trailer.

This axle has been accepted in every state where it has been shown—with the exception of Pennsylvania. Thirty-five states to date have been covered.

White has incorporated two other factors into this modification in an effort to provide for more payload. New side-mounted gasoline tanks located just below the cab and well forward help to transfer more weight to the front axle and to reduce weight on the tractor axles by that amount. These tanks are available on other White models.

The axle to bumper dimension has been shortened, permitting a gain in many instances of a foot of "L" in the bridge formula and table states.

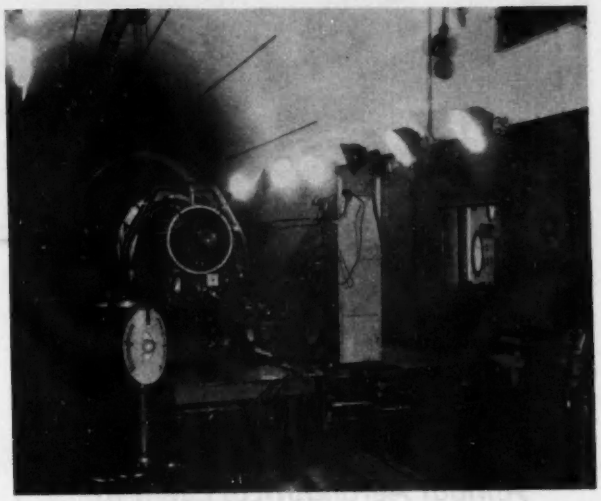
Test Cell Protection

at Westinghouse Jet Engine Plant

EACH of the test cells for turbo-jet engines at Westinghouse Electric Corporation's Aviation Gas Turbine Division plant in Kansas City, Mo., is continuously monitored for combustible vapor mixtures by an individual air sampling and alarm system. These systems are a development of the Mine Safety Appliances Co., Pittsburgh, Pa.

The vapor analyzing and alarm instruments are located in the test cell control rooms where they are under constant surveillance. There is one control room between each two test cells. Air from the test cell is drawn continuously through ⅜-in. copper tubing to the instrument. Turbo-compressors on a manifold system provide the suction for sampling air from several cells each. Within the analyzer, the air sample passes over one of two electrically heated platinum filaments which form a balanced electrical circuit. The second filament is encased in a cell containing fresh, uncontaminated air. Any combustible vapors present in the aim sample are burned on contact with the first filament. The increase in temperature, caused by the burning vapor in the sample, unbalances the electrical circuit in direct proportion to the degree of vapor concentration.

The instruments at Westinghouse are calibrated to signal an alarm if the vapor concentration in the test cell reaches 20 per cent of the lower explosive limit. When this concentration is detected, the instrument's alarm circuit is closed magnetically. A red signal light flashes on and horns sound in the cell and the control room.

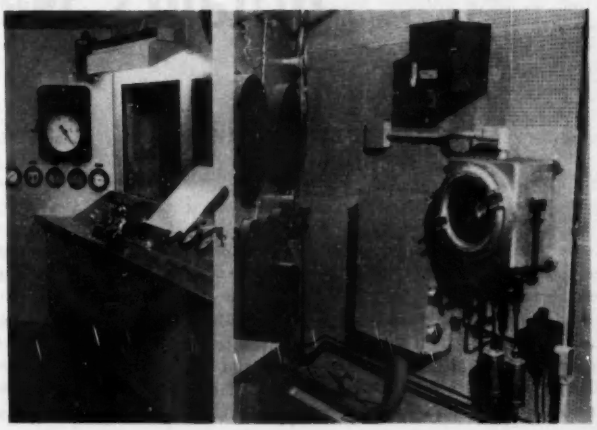


Westinghouse J-34 turbo-jet engine is shown here in one of the test cells at the company's Aviation Gas Turbine Division plant in Kansas City, Mo. Intake for sampling of air is located beneath the working platform.

A Cardox fire extinguishing system automatically can flood the cell with carbon dioxide. Manual controls for this system are also located both in the control room and outside the cell door. Portable fire extinguishers and fire blankets are ready for instant use.

(*Turn to page* 114, *please*)

Control room contains all equipment for operation of test cell. At right is MSA Combustible Gas Alarm which analyzes air samples from test cell. Mechanical filters below analyzer are used for fresh air and sample air lines.



New version of the Vickers Valiant jet bomber. It has thinner wings than the original prototype, and the air inlet for its four Rolls Royce Avon engines have been enlarged.

OUTSTANDING PLANES AT THE EXHIBITION

- Britannia, largest turboprop airliner
- Saunders-Roe 140-ton flying boat
- Vickers Armstrong Valiant four-engine bomber
- Avro Delta 698 delta wing bomber
- Gloster Javelin, delta wing bomber with two jet engines
- Hunter F1 Hawker interceptor
- Fairey Gannet anti-submarine fighter
- Blackburn Mark 2 freighter
- De Havilland 110 multi-purpose fighter
- Canberra-Avon bomber with afterburner

Annual Aeronautical Event at Farnborough Features Delta Wing and Gas Turbine Powered Aircraft

Britain's New Military and

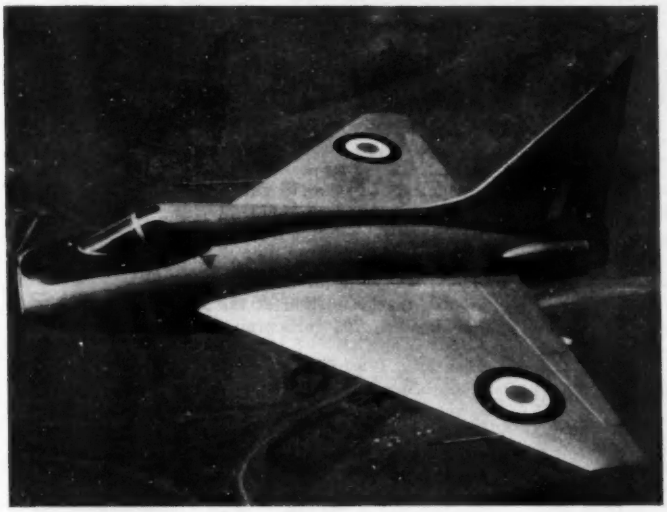
By W. F. Bradley
Special European Correspondent
for AUTOMOTIVE INDUSTRIES

LONDON, ENGLAND

MILITARY and civilian planes of all types, new turbojet and turboprop engines, together with supersonic flight demonstrations made the 1952 Flying Display and Exhibition by the Society of British Aircraft Constructors at Farnborough last month the most brilliant in the series of seven postwar shows. It thrilled thousands of distinguished visitors from all parts of the world, while holding back from details, which for security reasons had to be kept secret. Some of the planes could not be examined at close quarters, one was not allowed to land on the ground, and no performance figures were given on the delta wing planes which formed an outstanding feature of the display.

The total exhibition comprised 56 aircraft, of which 21 were for ground inspection only and did not fly; nine were experimental types, four of them entirely new; seventeen were military, three of which were

Bristol Britannia which was seen in public at Farnborough for the first time. It can accommodate over 100 passengers.



Boulton Paul delta wing research plane. It was unable to appear at the show as scheduled because of an accident while in flight.

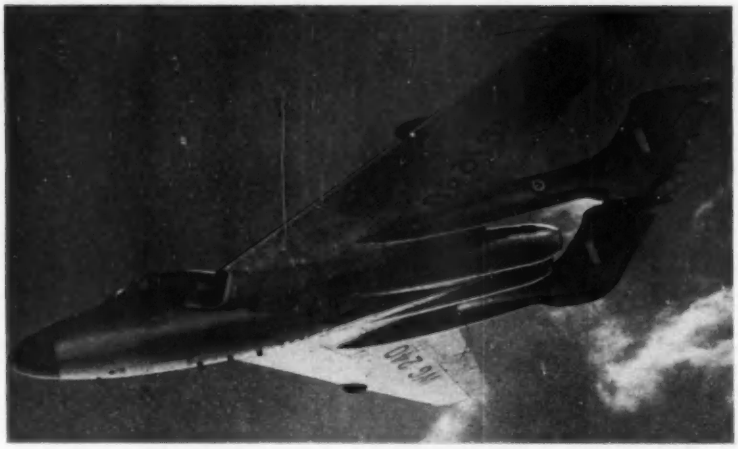
Civilian Planes

new and four modifications of existing versions; nine were civil, comprising three entirely new types.

Without ignoring the now completely proved Comet, the two outstanding airliners were the Britannia, produced by the Bristol Co. and the 140-ton Princess flying boat, built by Saunders-Roe of Cowes. Both of these are turboprop types. The present program appears to be to cut down on Brabazon production and, on the instigation of the BOAC, to give super-priority to the Britannia, 25 of which have been ordered for service.

The future of the Saunders-Roe 10-engine Princess flying boat is somewhat uncertain. Three were ordered and work was started on them. The first should have been launched last March but construction was delayed and it took off only a few days before the exposition opened. Obviously it could not be seen on the ground, but was flown daily. It is not known if and when this first flying boat will go into service. The second ship will be "cocooned" and the third will be stored in sections. The Princess was designed to fly non-stop with full allowance or headwinds on stage lengths of 3500 miles. Its 10 Bristol Proteus turboprops deliver a total of 35,000 hp, giving it an estimated cruising speed at high altitudes of 380 mph, and its figure-eight section hull is capable of carrying 100 passengers in comfort and many more in tourist-type seats. It is pressurized to maintain 8000 ft equivalent cabin altitude at operating height.

Handley Page announces that it has on the drawing boards a new high-speed jet-powered airliner — the H.P. 97—with a load-carrying capacity of 50,000 lb. It is planned to make non-stop trans-Atlantic flights, completing three journeys in 24 hours. On eastbound flights 122 passengers and their baggage would be carried in 6½ hours, and on westward trips the number would be decreased by five and the journey would take an hour longer. Three of these giant airliners could carry more people across the Atlantic in one year than either of the Cunard Line Queen steamships.

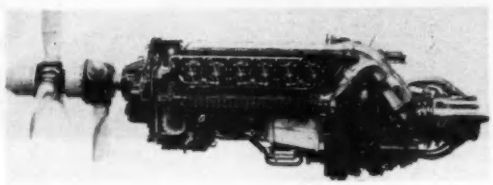


De Havilland 110 all-weather, multi-purpose fighter. It shattered in the air following a dive at supersonic speed and a low level high speed pass over the airfield during a demonstration for 120,000 spectators at the show, killing 25 spectators as well as the pilot and observer. Dive speed was estimated at 700 mph for eight miles.

The plane will have a double-bubble, two-deck fuselage, and on the tourist version will have triple seats each side of a central gangway, with accommodation for 16 passengers on the lower deck. There will be 1000 cu ft baggage space at the front and rear of the lower deck, with a centrally placed bar and dressing rooms.

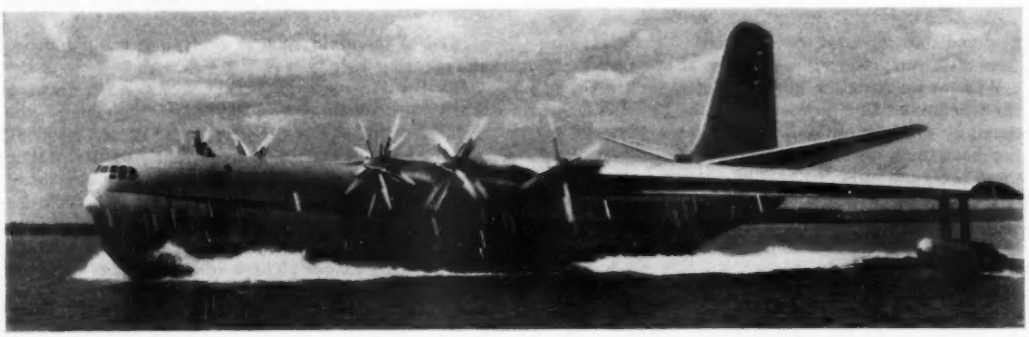
Of the De Havilland Comets, 49 are now ordered or delivered. Twenty-one are Ghost-powered Series I planes, in 36-passenger form. The 13th Comet and subsequent craft in the Series I will be sub-designated "A" and will have extra internal-wing tanks, raising the fuel capacity from 6050 to 7000 Imp gal, and water-methanol injection. The Series 2 will all be Avon powered, capable of operating on 2500 mile stage lengths, and will have the speed stepped up from 490 to 500 mph. There will be a Series 3 with larger fuselage, details of which are not yet available.

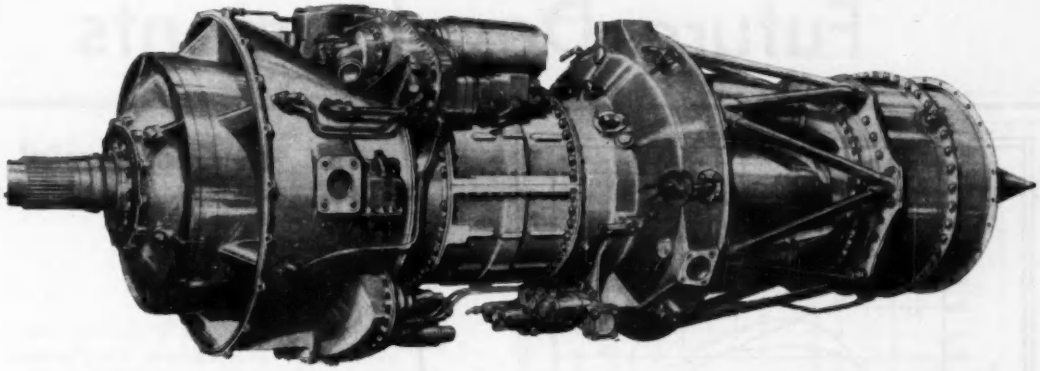
It is not expected that the Britannia series will be in full flight operation before 1955. The main reasons for adopting this design appear to have been more economical operation, longer range and better facilities for taking off and landing on existing runways than is possible with existing tubojets. If the Brabazon is looked upon by many as an expensive white elephant, the experience acquired in its construction has made possible the production of the Britannia which, with four Proteus 705 turboprop engines will be able to



Latest model of the Napier Nomad engine. The rear propeller hub is driven by the crankshaft of this 12-cyl Diesel while the front hub is powered by a gas turbine operating on exhaust gas from the engine.

Saunders-Roe 140-ton Princess flying boat which is powered by 10 Bristol Proteus turboprops. The engines develop a total of 35,000 hp.





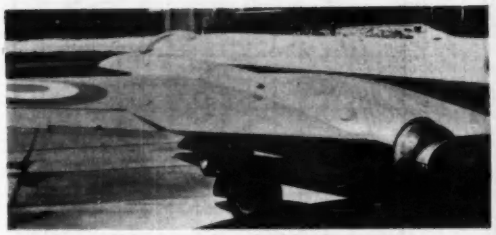
Napier Eland turboprop. Net dry weight of the engine is 1575 lb and takeoff horsepower is 3000. This new engine was shown for the first time at Farnborough.

take off at 140,000 lb gross weight in 3700 ft. Its best performance will be at heights above 25,000 ft, and carrying a payload of 25,000 lb the plane will be able to cruise for 3200 miles at 380 mph. The fuselage will be pressurized to the equivalent of 6000 ft up to 35,000 ft, and passenger arrangements are for 51, 61, 75 and 104 persons.

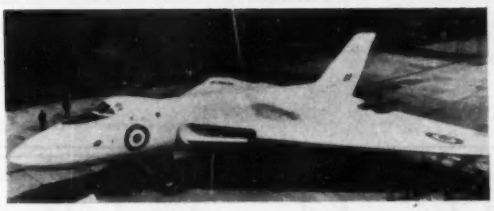
The Britannia has a span of 140 ft, length 114 ft, height 36 ft, 8.3 in, wing area 2055 sq ft, and gross weight 140,000 lb. The fuselage is cylindrical for a considerable portion of its length, with a diameter of 12 ft, diminishing to 10 ft at the forward bulkhead and eight ft, four in. at the rear pressure bulkhead. The semi-monocoque nacelles are an integral portion of the wing. The engines are Proteus 3 turboprops of the 705 series, stated to develop up to 4100 eshp at sea level, with a specific fuel consumption as low as 0.48 lb/hr/eshp at the designed altitude of 35,000 ft. De Havilland 16 ft hollow-steel propellers are used and provide reverse-thrust braking in addition to the normal constant-speed and feathering functions.

Much attention was drawn to the Blackburn & General Universal Freighter which although not new has been gradually modified until the Mark I and Mark II machines have four Bristol Hercules or Centaurus engines, mounted in nacelles on the high wing, with a gross weight of 105,000 lb. The model on exhibition was a military type with rear ramp loading, carrying a field gun and a personnel truck with parachute equipment. Another version is a three-decker, with the two lower decks for automobiles and the top deck for passengers. This machine is intended for short range operation from secondary fields, and has been put on the priority list for military requirements. One application is the carrying of 130 troops with full equipment.

Most spectacular were the flying displays of planes capable of supersonic speeds. In most cases these were on the secret list and few or no particulars were given regarding their construction and performance. In the



Canberra-Avon bomber equipped with afterburner and powered by two Rolls Royce Avon gas turbines.



This Avro 698 delta wing bomber was demonstrated in flight but was not permitted to land at the show. Built by the A. V. Roe Co., and equipped with four jet engines, it is said to be the first large-size delta in the world. United Press photo.

case of the four-engine delta wing 698 bomber, built by the A. V. Roe Co., this was not allowed to land on the flying ground, but was brought over escorted by an Avro Type 707A and a Type 707B, each of these being delta-wing research aircraft with one Rolls Royce turbojet engine. The 707B first flew in September 1950, and the 707A took the air for the first time in the summer of 1951. The main difference between the two types is that the 707A has air intakes in the leading edge of the wing instead of on top of the rear fuselage. Both types are fitted with an 8-ft tail parachute for use as a landing brake. Dimensions of the 707A are span 34 ft, two in.; length 42 ft, nine in.

(*Turn to page* 85, *please*)

Future Developments

in Commercial

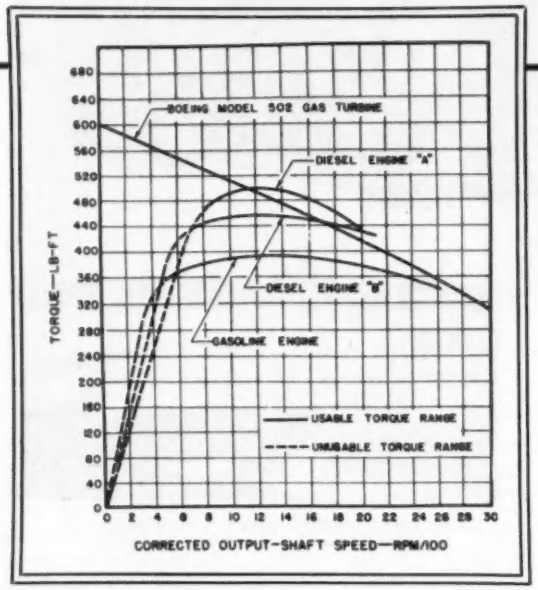
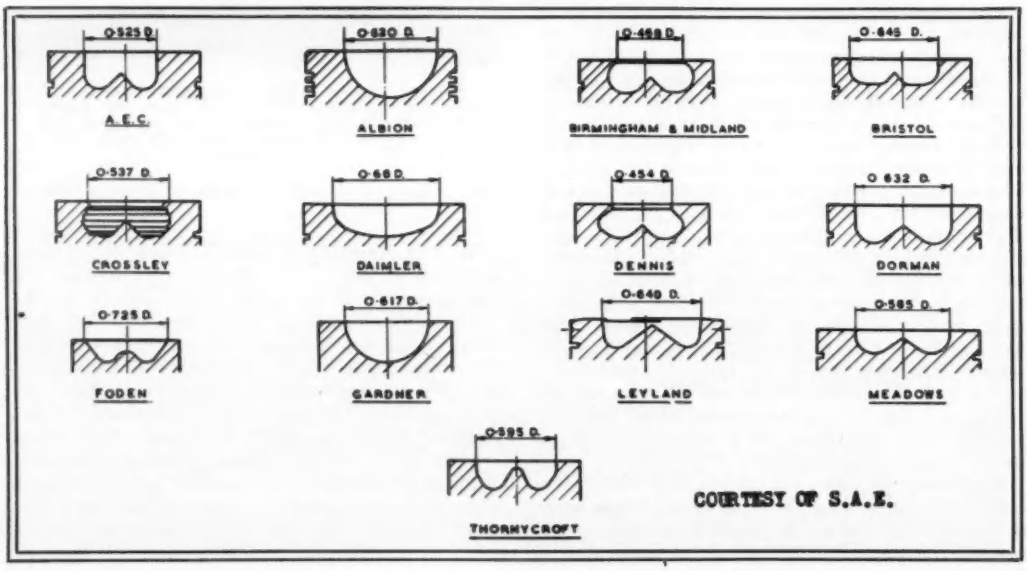


Fig. 1—Gas-turbine torque curves as compared to Diesel engine in truck installation.

THE influence of fuel is a pertinent consideration in the development of any power plant for whatever purpose. If a search is to be made for future power plants, the fuel to be used as the source of energy must be clearly defined.

History is repeating itself. We know the story of the automobile, how the earliest models were seriously under powered. Gradually, the customer demands showed the way toward using higher powered engines in automobiles in order to provide the driver with the desired performance. The motor truck went through the same sequence of events, but at a later period of time. At the present time the earthmoving industry is in this same cycle of moving up in power demands to provide the desired performance and to reduce operating costs. In present earthmoving equipment, of the rubber-tired type,

Fig. 2—Combustion chambers of direct injection toroidal type.



By C. G. A. Rosen
Consulting Engineer,
Caterpillar Tractor Co.

Vehicle Engines

engines are being fitted as high as 500 hp. Contractors and operators could very well employ 700 hp and obtain many desirable advantages. For instance, in one piece of earthmoving equipment a scraper fitted with a 90 hp engine showed a cost for moving earth on a particular job at 20 cents per cu yd. By installing an engine of 250 hp in this same piece of equipment the work was done at 15½ cents per cu yd. The desire to move loads at higher speeds on steeper grades will foster the necessity for the manufacturer to provide higher powered engines in his equipment. It is quite conceivable that the day is not far distant when 1000 to 1200 hp will be needed in order to accomplish the desired reduction in earthmoving operating cost. In providing such horsepowers the power plant becomes a dimensional problem in order to satisfy the availability of space and weight limitation.

The trend in vehicle power plants for commercial usage is higher horsepower outputs per cubic inch of piston displacement and higher horsepower per unit of space.

As we project our vision to the horizon of possibility we see the milestones of achievement trending in this direction. When one is confronted with the necessity of providing 1000 to 1200 hp in commercial vehicles to achieve the higher output within the limits of space, one turns to the prospects of the gas turbine.

Performance characteristics of a gas turbine as compared with the Diesel are shown in Fig. 1. Particularly for earthmoving equipment the torque characteristics of the gas turbine have a fascinating appeal. Such torque characteristics are also influential in reducing the cost of the transmission system. It provides wider variation of speed changes with simple mechanisms. Naturally, such equipment must compete with the Diesel engine in over-all operating costs which involve the influence of first cost, of fuel cost, as related to fuel economy, and maintenance cost. It is undoubtedly true that with time the first cost of the gas turbine will be considerably reduced. Its exact commercial position in this respect is as yet uncertain. The fuel economy is known to be much poorer than the

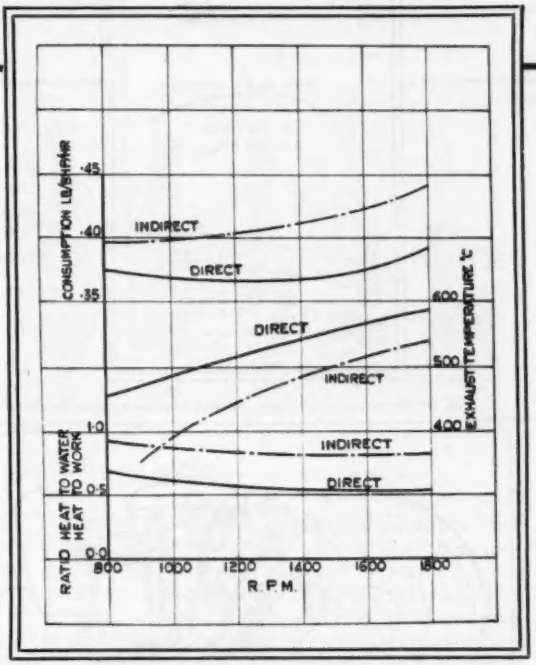
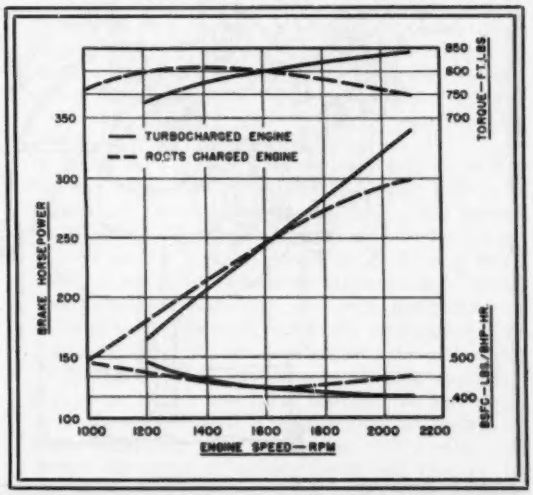


Fig. 3—Performance data of high economy British bus engines.

Fig. 4—Comparative performance curves for turbocharged and Roots-charged engine.



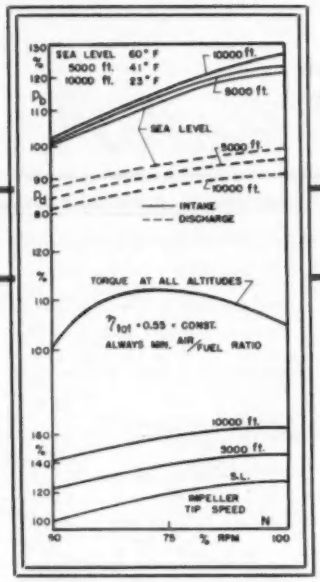
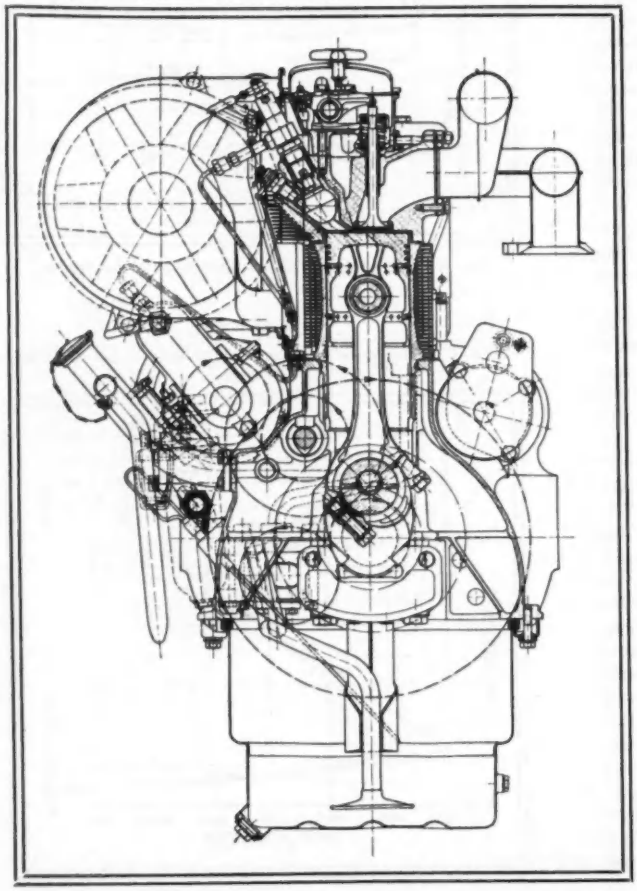


Fig. 5—Performance characteristics of the turbosupercharger system using the variable-area nozzle control.

Diesel, but the possibilities of multiple units to overcome the high consumption rates at light loads on gas turbines may permit the cutting-in and cutting-out of multiple units with desirable economies and satisfactory operating performance. In scraper operation, for instance, it requires twice as much power to load as it does to run with the load. Under such conditions the power plant could be cut in half and one unit shut down after the scraper is loaded. This scheme also suggests the use of an auxiliary unit such as a gas turbine as a booster unit to provide the necessary power requirements for short durations and opportune intervals. Reasonable economy can be attained on lower cost fuels than on fuels necessary for use in Diesel practice, particularly when premium fuels are required for the latter service.

Fig. 6—Cross-section of Deutz divided chamber combustion Diesel engine.



In our American economy it is difficult to evaluate the significance of specific fuel consumption. Great emphasis is placed on this factor in Europe. Fuel is the highest factor in operating cost of the British omnibus. Such significant values placed on fuel cost have naturally fostered the development of the direct injection type combustion system. The various types of combustion chambers which have been developed to achieve high economy of fuel are shown in Fig. 2. The AEC design as illustrated and developed by Mr. Dicksee has been responsible for achieving fuel consumption as low as 0.36 lb per bhp hr. Interest is being displayed in the fact that recently licenses have been obtained in the U. S. for two of the engines, characteristics of which are shown in Fig. 3. These are to be used in the truck and bus field. In bus operation, particularly, where extreme cleanliness of exhaust and freedom from odor are highly desirable in congested areas,

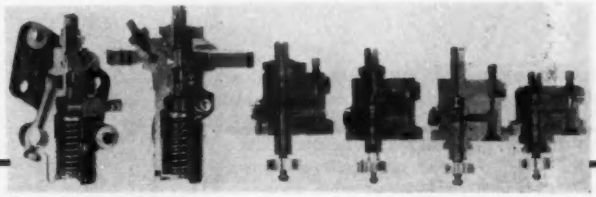


Fig. 7—Directly right shows evolution of fuel pump design.

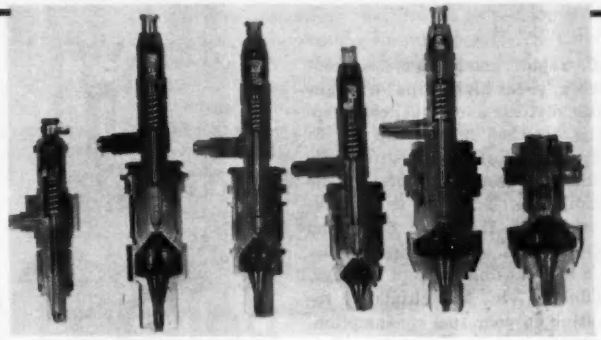


Fig. 8—Directly above shows evolution of fuel valve design.

the exhaust must be free of the contaminants which produce undesirable effects. American manufacturers are being made cognizant of the appeal of this type of engine to achieve satisfactory operating performance without resorting to premium fuels.

The trend toward four-stroke supercharged vehicle engines is quite significant. Here is a real opportunity to achieve higher output per cubic inch of displacement and to take advantage of the corresponding reduction in space requirements. Supercharged four-stroke Diesel engines as now manufactured and marketed for vehicle use average about 135 lb bmep with about a six to 10 lb boost in supercharge pressure. The real crux of the problem in achieving still higher output is the blower. Under present conditions the blower is retarding the possibilities of supercharging because of its inefficiency or its inability to match the performance requirements of the vehicle. The Roots type blower has definite limitations and it is generally conceded by authorities like Ricardo that its optimum discharge pressure is about 7½ psi. Centrifugal type superchargers have possibilities but have not been fully explored as to their adaptability to variable-load, variable-speed engines. One promising goal of supercharging is the utilization of the turbo-supercharger. A problem exists, however, in matching the turbo-supercharger to the engine in order to achieve the desired torque characteristics, as illustrated in Fig. 4. The positive displacement type blower has the opportunity, through suitable controls, of providing the desired type of torque curve for vehicle operation, whereas, inherently the turbo-supercharged engine has a drooping torque curve not satisfactory for variable speed operation. The influence of these two types of blowers is revealed in the specific fuel consumptions obtained. However, the possibilities have not been fully developed in practice.

The problem of matching the blower to achieve the desired torque characteristics under varying altitude conditions and under extremes of ambient temperature, calls for construction features which modify the performance of the turbo-blower to obtain satisfactory results. Fig. 5 illustrates the opportunities for achieving desired performance by a system of variable nozzle controls of the gas turbine unit of the turbo-supercharger.

The significant development of the MAN Co., Germany, in achieving high output (200-300 lb bmep) in supercharged Diesel engines, is very refreshing and bids well to stimulate comparable developments in vehicle type four-stroke Diesel engines. At the present time where the top performance of the high speed four-stroke supercharged Diesel engine may seem limited by the blower, there are further opportunities in the thermo-dynamic cycle to achieve higher output with low heat distress loads. The blower is largely responsible for problems associated with the filling and scavenging of the engine cylinder to achieve optimum combustion performance. Retention of residual gases or the inability of the system to fill the cylinder completely with air at relatively low temperature of charge, presents an intriguing challenge.

The MAN engineers have achieved outputs of 300 per cent increase by efficient supercharging with only 30 per cent increase in heat load through the piston. This has been accomplished by the superior loading of the cylinder with excess pounds of air in such form that it is readily available to the injected fuel for rapid combustion without shock and with completion of burning during the early part of the expansion stroke. Particular attention has been given to the cycle from 25 deg before firing top-center to about 30 deg after top-center. In this interval of the cycle the peak pressures have been raised to 1700 or 1800 psi for 215 lb bmep output. In view of the fact that during this period the piston is moving slowly and uncovers a minimum of cylinder wall surface the accomplishment

of rapid combustion, without shock, yields high output with low heat distress and a fuel consumption of 0.308 lb per bhp hr. In supercharging high output engines it is essential to prevent the deadly after-burning, or the combustion of fuel, far down the stroke, thus overheating the piston and causing damage to rings, cylinders, etc., and ultimately resulting in poor fuel consumption.

There is a very inviting challenge toward the achievement of higher output in the future in supercharged Diesel engines with improved blower adaptations and designs and greatly improved combustion characteristics. The four-stroke supercharged Diesel engine could well be increased to 300 per cent of the present normally aspirated engine without undue stress of parts in thermal loading.

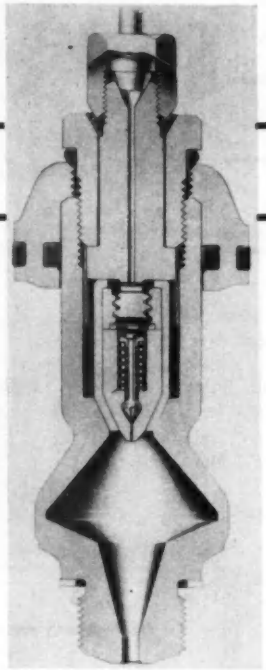


Fig. 9—Cross-section of simplified fuel nozzle.

During World War II, considerable development activity in Germany as well as in England and in Switzerland was centered around the aircooled Diesel engine. The problems of portable operation over wide ranges of atmospheric temperature and the need for setting up emergency power plants in almost any location, gave great impetus to the development of the aircooled Diesel. At the present time a number of manufacturers on the Continent and several in England are making available aircooled Diesel engines for vehicle and industrial application. The Deutz unit, as illustrated in Fig. 6, is perhaps the most aggressively promoted aircooled Diesel now being built in Germany. It is built in sizes from 12 to 175 hp and in designs from single-cyl to V8 engines. In the V8 model the engine weighs 10.2 lb per bhp using conventional materials and commercial manufacturing techniques. Bmep is about 80 psi for industrial applications and 90 psi for intermediate type service. One of the factors which has contributed to the development of the aircooled engine in its present form in Europe is the advancement made in cooling fans. Expanded knowledge of aero-dynamics, associated with directing suitable cooling currents of air over cylinder fins and temperature dissipating surfaces, has proved the desirability of the aircooled system.

Also of significance is the growing tendency toward the use of the swirl chamber combustion system for this type of construction. The Swiss Locomotive Works has an aircooled engine built on the toroidal type of combustion chamber direct injection system but the Germans have centered their efforts on the swirl chamber type.

Another avenue of approach in developing high output engines is by the increase of engine speed. Significant in this direction is the development of the Cummins high speed engine. The problems of designing Diesel engines to operate at high speeds are even more difficult than for operation at high bmep. Maximum mean effective pressure of the Cummins unit is 170 psi at 4000 rpm.

It has been found by the example shown in the Cummins engine as well as by work conducted at Caterpillar on a small bore, high speed aircooled unit that speeds up to 6000 rpm are achievable without jeopardizing essential Diesel economy. It is anticipated that the future will reveal more of this type of design in an effort to capture the market for high output, high economy engines.

In two-stroke Diesel engine practice we all have become accustomed to the capability of the uniflow scavenge system to achieve small packages at light weight, as in the General Motors 110 Series Diesel engines. The two-stroke engine is not so susceptible to high output improvement by supercharging as is the four-cycle engine, although results indicate that a 30 per cent increase in output is possible by the utilization of turbo-blowers for supercharging the two-stroke Diesel.

Of considerable interest at the present time are new developments in the loop-scavenged two-stroke Diesel engine. Perhaps most significant in this direction is the Schnurle type of loop-scavenging as developed in the Krauss-Maffei engine. The engine is now being investigated by several American companies for vehicle application. It is built in a V design to achieve minimum over-all length and has manufacturing features which are of much interest in cost reduction of Diesel engines. The loop-scavenged system permits an

(*Turn to page* 100, *please*)

High Speed Heating of Spring Leaves

FORD Motor Company's plant at Green Island, N. Y., produces a variety of semi-elliptical leaf springs for passenger cars and trucks and the variable-rate spring shackle hanger on which the rear end of the rear passenger-car spring is mounted.

In the production of leaf springs and spring shackle hangers, the rolled steel bar is usually received in lengths of approximately 30 ft from which the "blank" or bar for each leaf is cold sheared to length and pierced at or near the center for the center bolt that holds the assembly together.

In the case of the spring shackle hanger, the "blank" is cut off from 2½-in. wide bar and notched to two in. on the ends to provide for the eye curling operation. These blanks are made double length with a notch for eye curling cut out on each end of the blank. Each blank makes a pair of hangers, one right, and, one left, by cutting it off in the middle during the subsequent forming operation.

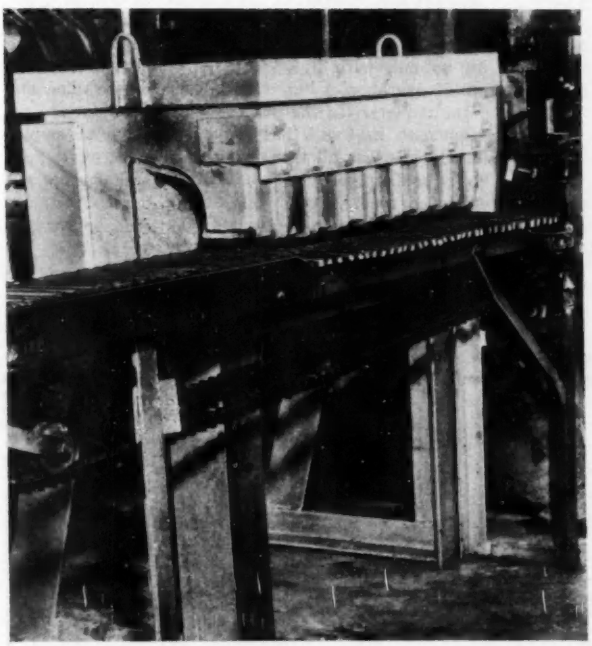
The eye curling operation requires the ends of each bar to be heated to the lower range of the forging temperature, about 1900 to 2000 F, for about four in. back from the end. Heating the end only saves fuel and permits the bar to be handled by the operator through the eye-curling machine. The center of the bar remains cool enough for an operator to handle by wearing heat-resistant gloves.

End heating at Green Island is done by high-speed, end-heating furnaces which fire the gas directly into a refractory swirl chamber that heats the bar end from top and bottom by both convection heating from the burning gas and by radiation from the hot refractory. As in all modern high-speed heating applications, the high heating rates are due to the high temperature gradient between furnace and work.

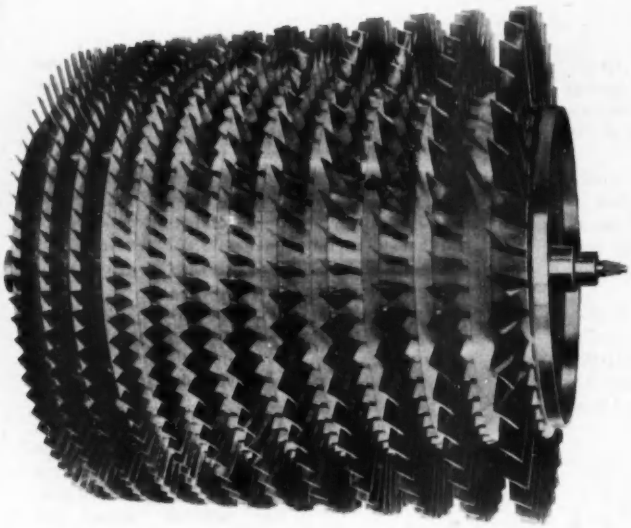
Two sizes of these Gas Appliance furnaces are used at Green Island, a 14-burner size and a 20-burner size. The 14-burner size is used to heat the ends of the blanks for the spring shackle hanger and the 20-burner size for truck spring leaves. In the first mentioned application, the furnaces are arranged singly, one end of the double blank being heated, eye curled and placed on a conveyor which conducts it into the second furnace where the opposite end is heated.

After the second eye is curled, the double blank is laid on the walking beam of a large electric furnace used to heat the entire blank for bending to shape and separating into two hangers. The production rate through these two furnaces is dictated by the speed of the eye curling operations and the adjustment of each furnace is set so that the ends of the blank will be heated to the proper temperature in this required length of time. Approximately 600 blanks per hour can be end heated in this setup.

The larger, 20-burner units are arranged to heat both ends of a spring leaf at the same time by mounting the conveyor or carrying the leaves midway between the furnaces. The furnace setup can heat 500 leaves per hour on both ends simultaneously.



Close-up of one of the Gas Appliance, Roto Flame single-end furnaces at Green Island.



Precision Jet

One of the large axial flow compressors after assembly at the Robbins Division plant in Detroit. This plant handles the machining of all component parts, and delivers completely assembled rotors to the customers.

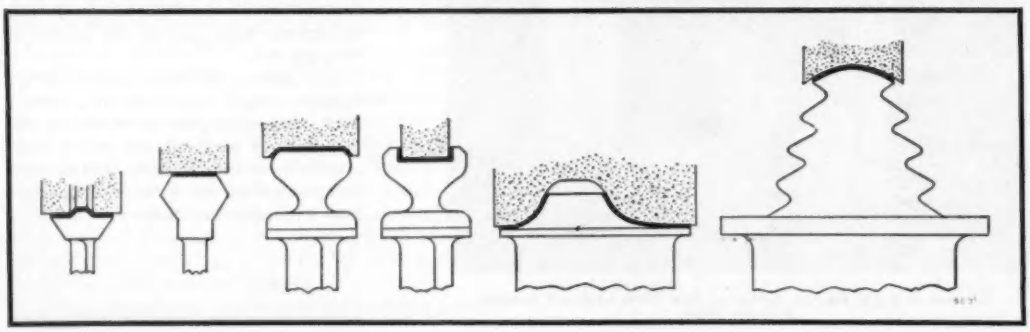
IT is fortunate that the U. S. Air Force has encouraged the many manufacturers engaged in the making of blades, vanes, and buckets for jet engines to develop their own unique methods of producing these elements. Requirements for such blading are enormous, and would be still greater in the event of all-out emergency. The exploitation of many different methods of approach is bound to develop preferred techniques for wider adoption.

In the recent past we have described the methods of producing stator blading with iron powder metallurgy; and the precision forging technique now in use. (See AUTOMOTIVE INDUSTRIES, November 15, 1950, page 40, and June 15, 1952, page 34.) Blading also is made by the investment method, by roll-forging, and still other ways.

This article is concerned with the unique process developed by the Ex-Cell-O Corp. for making blading for rotor elements. The basic philosophy is to use relatively rough forgings which can be made by any drop forging plant without resort to intricacy of forging die design and production. Die equipment is relatively easy to make and is said to have much longer useful life, and thus constitutes less of a drain upon die materials and skilled labor.

Starting with the premise that skilled labor saving is in the best interest of the economy in critical times, Ex-Cell-O undertook development of machinery especially designed to machine and grind and polish blading not only with high productivity and relatively favorable overall cost but with the use of unskilled machine tenders. In the present state of production development, Ex-Cell-O has found it feasible to employ female help for all machining operations. The relatively smaller percentage of skilled male workers are employed, specifically for tool setting, for maintenance, for tool and die making, quality control, and for certain cutter grinding operations.

These drawings illustrate a variety of operations on blades and buckets that can be done on the Ex-Cell-O precision surface form grinder.



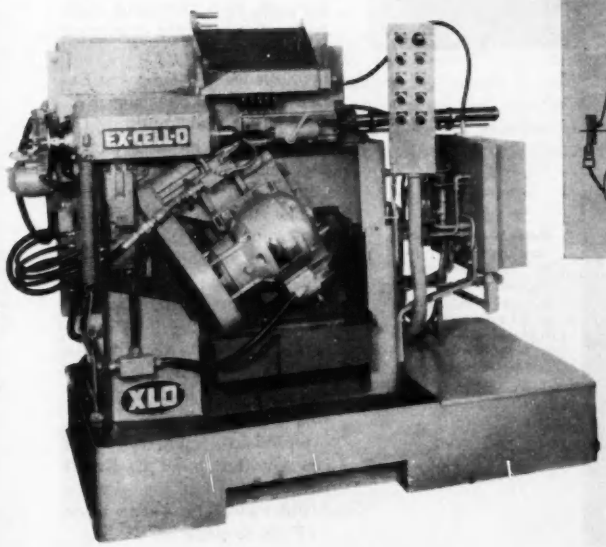
By Joseph Geschelin

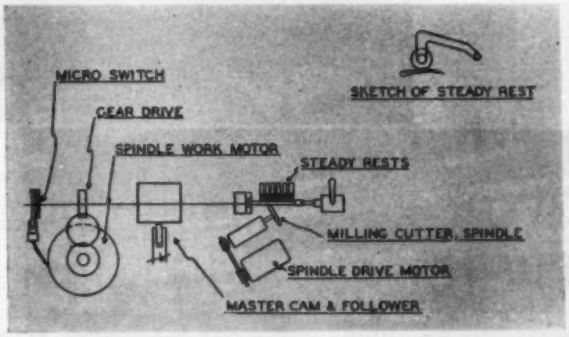
Engine Blades—

from Rough Forgings

Ex-Cell-O, known as one of the leading machine tool manufacturers, thus is continuing its role as a machine tool builder on the one hand, and a producer of precision parts at the same time.

Incident to the blading program for a number of major jet engine builders, Ex-Cell-O recently placed in operation two new plants in Ohio—a 40,000 sq ft operation in Fostoria, and a newly built plant of modern design in Lima, the latter having a floor space of 171,500 sq ft. At the present writing both plants are equipped for making blades of wide variety, both featuring the same type of Ex-Cell-O blade finishing machinery. While each plant is equipped and manned for handling current production requirements, both have ample room for expansion when greater volume is required. *(Turn to next page, please)*





This is a schematic drawing of the principal elements of the profile milling machine. The master cam and follower, not visible in the photograph of the machine, may be seen in their relation to the other control elements.

Close-up of one of the Ex-Cell-O profile milling machines. The cutter head and drive mechanism are directly in the center. The steady rests may be seen directly over the blade. The toothed wheel, controlling the number of elements to be milled on each blade, is on the work spindle off the end of the machine at the extreme left.

View of one of the bays in the Lima plant, showing arrangement of a self-contained department for finishing a single type of blade. The milling machine used for centering the rough blade may be seen at the head of the line in the foreground.

Some of the Ex-Cell-O profile milling machines are shown in the foreground of this view in the Lima plant.

Here is the inspection department. In the foreground are the benches for visual and gage inspection of blades; in the background is a row of Magnaflux inspection machines.

Generally speaking, the Ex-Cell-O technique may be described briefly as follows:

1. All blading is made from inexpensive rough forgings, annealed at the source.

2. As received, the forgings are best treated in electric furnaces, under closely controlled conditions, to develop the desired grain structure and hardness.

3. Next the foot or root is ground in two operations in Ex-Cell-O precision blade root form grinders. The Style 85 Precision Two Wheel Form Grinder simultaneously grinds the two sides and flange of the pine tree or dovetail form roots to the desired form tolerances. The Style 84 Precision Surface Form Grinder grinds the various type retainer slots in the bottom of the root section, also the tongue relief on both ends of the root section.

4. Blades then go to a special setup, usually in a Cincinnati mill, for centering the nib at the tip. Locating from the ground foot member, this operation makes for accurate alignment of the blade for other operations. At the same time, the mill is so tooled as to finish the nearest edge of the root, thus providing three points for accurate alignment in the fixtures.

5. Blades now enter the Ex-Cell-O Style 86 Precision Profile Miller for milling the blade surface all over including the leading and trailing edges. Here the blade is held at one end in a special fixture conforming to the shape of the root, and on a center at the other end. As will be described later, a single milling cutter of as large a diameter as the form will permit does the job by cutting elements along the length of the blade, one at a time.

6. This is followed by finish-grinding in an Ex-Cell-O Style 87 Precision Profile Grinder having the same basic

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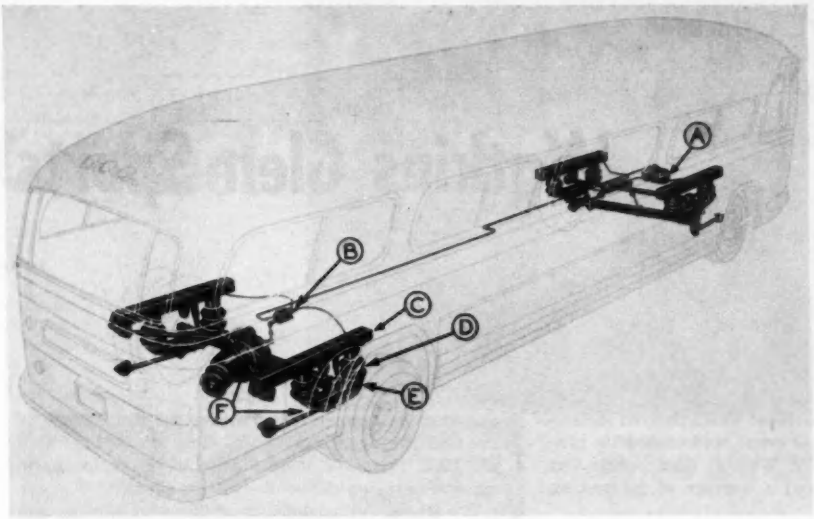

This phantom view shows the principal units of the air suspension system.

A—Storage tank.

B—Leveling valve.

C—Air chamber.

D—Air bellows.

E—Supporting beam.

F—Radius rods.

New GM Intercity Bus Has Air Suspension System

A REVOLUTIONARY air suspension system, which has been under development for more than 12 years, is the outstanding feature of a new bus—the PD-4104—just announced by GMC Truck & Coach Division, General Motors Corp.

As shown in the phantom view, principal parts of the suspension system are the storage tank, leveling valve, air chamber, air bellows, supporting beam, and radius rods. Compressed air from the coach air system is supplied to the leveling valves which in turn meter it to the suspension system. These leveling valves (one at the front axle and one at the rear axle) are actuated by relative motions between body and axles. For instance, as the coach is loaded and tends

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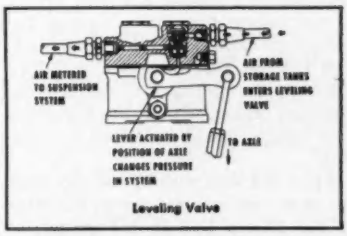
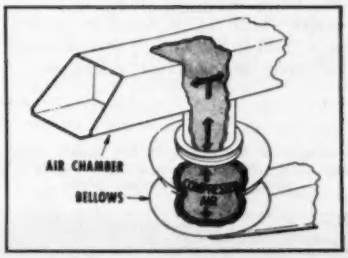
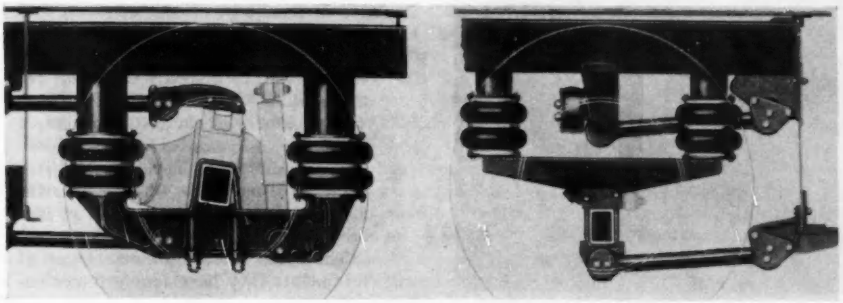

AIR METERED TO SUSPENSION SYSTEM
AIR FROM STORAGE TANKS ENTERS LEVELING VALVE
LEVER ACTUATED BY POSITION OF AXLE CHANGES PRESSURE IN SYSTEM
TO AXLE
Leveling Valve

Part-cutaway illustration of the leveling valve which keeps the body at a constant level whether the bus is loaded or unloaded.



Air chamber and bellows.



Far left gives close-up of rear suspension. Near left is view of front suspension showing air bellows, air chamber, radius rods, etc.

By Robert T. Jackson
Perfect Circle Corp.

Watkins Glen Sports

ABBREVIATED by an accident which marred the second lap of the Grand Prix event, and caused its ultimate cancellation, the 1952 Watkins Glen Sports Car meet nevertheless produced a number of interesting developments.

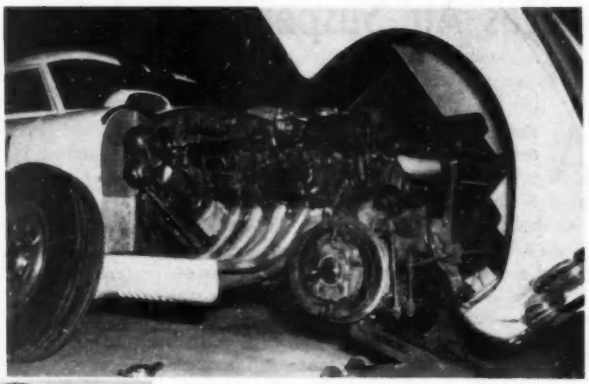
First among these must be listed the successful appearance of a Jaguar XK-120C driven by John Fitch in the Seneca Cup Race. George Weaver, perennial winner of various Watkins Glen competitions, led the first lap but was forced to withdraw when his engine began to foul and the Maserati brakes, with a rare perversity (for them), locked too often for comfort.

Fitch had been pushing the pace from the start and assumed actual command of the Seneca Cup in his second lap which he completed at the amazing average of 78 plus mph. His average for the entire race was 76.6 mph. The 120C really made the show and its expensive whine on the Franklin straight was a treat to the ears of this observer.

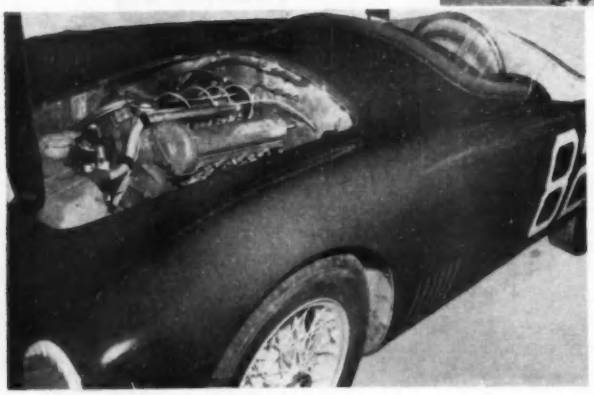
Without uncharitable intentions of any kind it is necessary to state that the balance of the field simply wasn't in the same race. Fitch and the 120C furnished most of the incentive for keeping one's eyes on the course in this event.

The Queen Catherine Montour Race for 1500 cc cars was a different story. Bill Spear, in his smoothly running Osca, led from the start, and handsomely at that, but there were several brushes farther back in the field which kept the crowd at attention.

Front end of the new Cunningham which was started in the Grand Prix by Phil Walters. Robert T. Jackson photo.



A glimpse of the engine in Bill Spear's winning Osca. This outfit displays a strong Maserati influence. Robert T. Jackson photo.

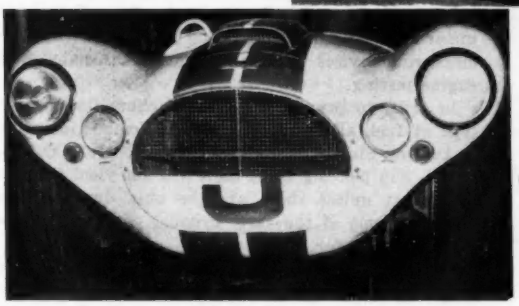


Jim Kimberly, also in an Osca, took a little time to catch Roger Barlow in his Simca, but got the job done well enough to take a steady second at the finish while Barlow held onto the third. The remainder of the field encountered numerous and mostly forcible vicissitudes, although the official results listed eight finishers. The Queen Catherine Montour race was shortened to 10 laps because of time urgencies.

The Oscas rate a little description at this point: they have four cylinder en-

Car Meet

John Fitch won the Seneca Cup Race in this Jaguar XK-120C. This type (or perhaps this identical car) won the 1951 Le Mans 24 hour race for sports cars. Robert T. Jackson photo.



Front profile of new Cunningham cars. Note the bladed brake drums. These were produced by the Al-Fin process. Robert T. Jackson photo.

gines of 81.7 cu in. (1340 cc) displacement which give an output of 98 hp at 6300 rpm. The Maserati brothers are responsible for much, if not all, of the design involved in the Osca. Only two of the brothers actually are with Osca; the third is with the present Maserati company *per se*.

The chassis of these sterling juniors is built up around a large diameter steel tube frame of welded construction, with independent front suspension by coil springs, and the familiar Maserati rear springing by quarter elliptics. The cars are very low and very light. Dry weight is given as 1240 lb! Fully loaded weight totals 1540 lb with a 170 lb driver!

The Oscas, in the hands of Spear and Kimberly, appeared to corner as sure-footedly as mountain goats and to scat with the agility of the fabled chamois. Their exhaust tone is a reassuring and healthy resonance but without blatancy. Oscas have been running on the Continent for some time—this is their second season over there; their first here. Spear received his car in time to win his event at Elkhart Lake, Wis., a few weeks ago.

Barlow and his Simca, this reporter has been told, are consistent performers in Western sports car meets. At the Glen the same statement would have applied. The race results were due entirely to an excess of Osca, so far as the Simca is concerned.

As for the Jaguar 120C's, their construction has been fairly well exposed by previous reports. The engines are understood to be fairly representative of the XK-120 heraldry. The chassis is a mono-structure body-frame unit with independent front suspension and a rather clever rear suspension involving the use of trailing lever arms. The cars appear to handle like the proverbial charm.

Two of the C's appeared at the Glen (according to my information very few of these have been built, if, indeed, these two are not the only individuals extant). The second, with Phil Hill up, started in the unfortunate Grand Prix, which was halted in its second lap by a regrettable casualty to several spectators at the foot of Franklin Street. Hill's C thus was not tested to its potential. Hill, like Barlow, is rated as a stout competitor in the Western states and in his hands the second C might have earned its brevet if the Grand Prix could have proceeded to its conclusion.

The Formula III cars, this year mostly Coopers, did not fare too well at the Glen but after one becomes reasonably well acquainted with the 6.6 mile course he does not question the performance of these little scooters. The fact that they can survive eight laps of this layout is in itself a tribute to their designers and those who maintain the cars.

Mechanically, the Watkins Glen cars this year displayed very few innovations. True, Bill Milliken showed up with an entry (the FWD) frighteningly heterogeneous in ancestry. It featured an aircooled opposed engine obviously obtained from some sector of the aircraft industry and a few design features just as obviously traceable to Rube Goldberg. A true reading on the performance of this car was lost to posterity when Milliken suffered a wheel failure in practice, prior to the Seneca Cup, in which he was entered.

The Cunninghams were entirely new this year, as

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Determination of Combustion Products

By James H. Potter, Professor of Mechanical Engineering
University of Illinois

SINCE the original presentation of the ingenious graphical formulation of the equations for the dry products of combustion of air-hydrocarbon mixtures devised by Ostwald,[1] the technique has been applied to the exhaust gas analysis of a wide range of fuels.[2] These include gasoline, blast furnace gas, natural gas, and Diesel and other oil fuels. The advantage offered by the Ostwald chart lies in the fact that the principal exhaust constituents and the air-fuel proportions can be evaluated graphically from a knowledge of only the percentages of oxygen and carbon dioxide.

In the field it is difficult to make accurate measurement of the carbon monoxide in the products of combustion. Accurate CO determinations are best made under laboratory conditions and by experienced personnel. Because the Ostwald chart obviates the need for CO measurement, it supplies an additional tool to the practicing engineer. Also, the air-fuel proportions can be found graphically to about ±2%. This is an important feature, eliminating the elaborate air-measuring devices which are normally associated with engine testing.

In order to prepare an Ostwald chart for a given type of fuel, all of the products of combustion must be known. Simply assuming distributions of CO, CO_2 and O_2 and plotting these data will not yield a workable chart unless these are the only dry products present. Some of the early exhaust gas charts were unsatisfactory for this reason.

A thorough study of this problem was made by the National Advisory Committee for Aeronautics.[3] One of the important variables was found to be the weight ratio of hydrogen to carbon. Using two grades of gasoline and two grades of Diesel fuel the H/C ratio was explored from 0.169 to 0.183. Careful measurements were made on fuel consumption, air flow, and exhaust gas analysis. It was found that both methane and hydrogen were present in the products of combustion. The former appeared to be constant over a wide range of fuels and test conditions. The hydrogen, however, was present in linear proportion to the carbon monoxide. Specifically, the methane averaged 0.22% by volume, and the hydrogen averaged 51% of the CO.

A 1939 survey of American motor fuels showed

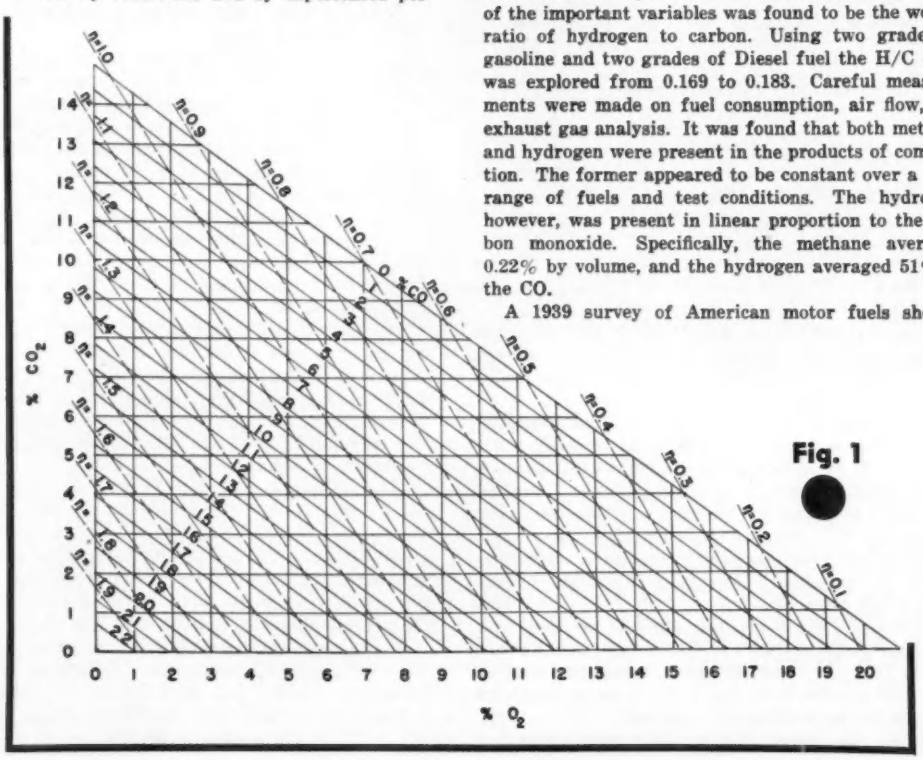


Fig. 1

that gasolines could be represented by a composition corresponding to $(CH_2)_x$. This was used as the basis for a new set of thermodynamic combustion charts.[4] Although C_8H_{16} is too expensive to burn as an engine fuel, the use of this molecule instead of C_8H_{18} is more appropriate in the stoichiometric equations.

The charts shown in Fig. 1 and Fig. 2 have been prepared for C_8H_{16}. It was assumed that the N.A.C.A. values for the methane and hydrogen would obtain in this case, as the H/C ratio was very close to those reported by Gerrish and Tessmann.

The detailed operations in the development of the equations are shown in the Appendix. The charts were plotted from the following equations:

$$O_2 + 1.3958\ (CO_2) + 0.9049\ (CO) = 20.941 \quad \ldots\ldots [1]$$

$$O_2 + 1.3958\ (CO_2) + 1.774\ (H_2) = 20.941 \quad \ldots\ldots [2]$$

$$\eta = \frac{35.05 - 1.658\ (O_2) - 0.815\ (CO_2)}{17.14 + 0.177\ (O_2) + 0.351\ (CO_2)} \qquad (3)$$

where:

O_2, CO_2, CO, and H_2 are the percentages by volume of these constituents in the dry products of combustion.

e is the percent excess air

η is defined by $\left\{\frac{1}{\left[1 + \frac{e}{100}\right]}\right\}$

As an illustrative example, consider an automotive engine operating with gasoline as fuel. Assume that the Orsat analysis shows 11% CO_2 and 4% O_2. The complete analysis of the dry products can be found as follows: From Fig. 1, at 11% CO_2 and 4% O_2, the CO is found to be 1.76%. Also, from Fig. 2, the H_2 is found to be 0.88%. Using either chart, $\eta = 0.896$.

Introducing the constant value of the methane at 0.22%, and finding the nitrogen by difference:

Constituent	Percent Volume in Dry Products
CO	1.76
CO_2	11.00
O_2	4.00
H_2	0.88
CH_4	0.22
N_2	82.14
Total	100.00

The excess air is readily found from the value of η:

$$\eta = 0.896 = \frac{1}{\left[1 + \frac{e}{100}\right]}$$

from which:

$$e = 11.6\%$$

Following are derivation of the working equations from which the charts were plotted. Let CO, CO_2, O_2, CH_4, N_2, etc., represent mol volumes of these constituents in the products of combustion. Assuming that all of the carbon in the fuel appears in the exhaust gases, the weight of carbon is then given by:

$$C = 12\ [CO + CO_2 + CH_4] \qquad (1)$$

Similarly, the weight of hydrogen is given by:

$$H = 2.015\ [H_2 + H_2O + 2CH_4] \qquad (2)$$

Let $\theta = H/C$, then it may be shown that:

$$5.955\ \theta\ [CO + CO_2 + CH_4] - H_2 - 2CH_4 = H_2O \qquad (3)$$

The nitrogen enters as a proportion of the total oxygen used:

$$N_2 = \left[\frac{79.1}{20.9}\right]\left(O_2 + O_2'\right) \qquad (4)$$

where O_2' is the oxygen used in combustion, and O_2 represents excess oxygen.

Then:

$$O_2' = [CO_2 + \tfrac{1}{2}\ CO + \tfrac{1}{2}\ H_2O] \qquad (5)$$

and,

$$O_2' = (1 + 2.978\ \theta)\ CO_2 + (0.5 + 2.978\ \theta)\ CO + (2.978\ \theta - 1)\ CH_4 - \tfrac{1}{2}\ H_2 \qquad (6)$$

(*Turn to page 176, please*)

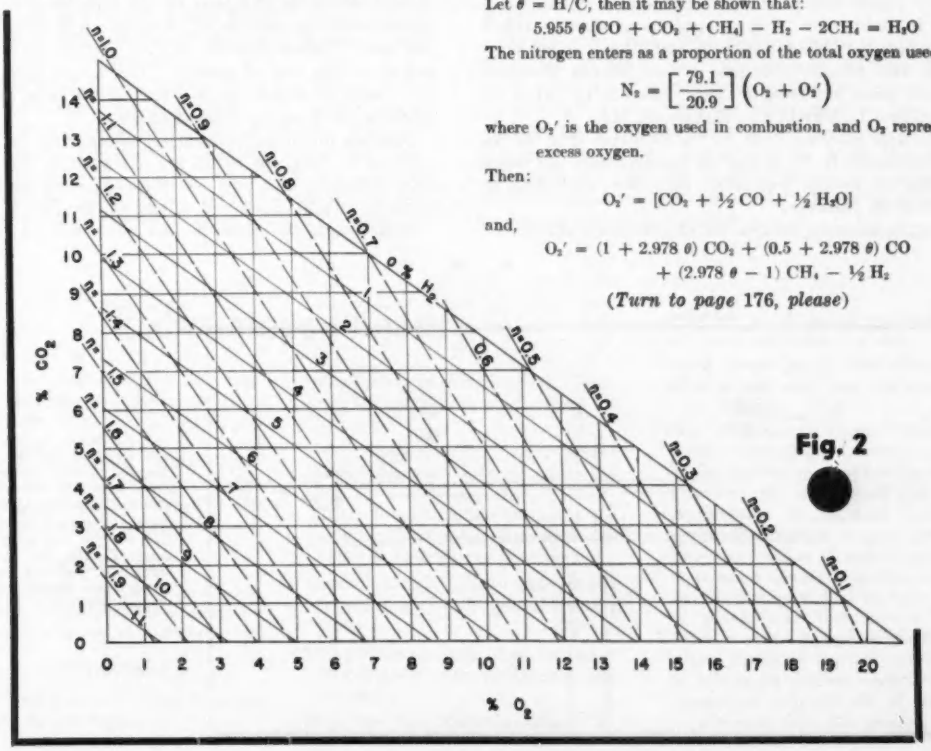


Fig. 2

Overall view of Sheridan stretch-press installation, showing control console at left. Contour die is in place on die table between opposing banks of hydraulically operated gripper jaws. Operator applies a grease to the surface of the die before each use of the machine.

Second illustration shows operator inserting sheet to be formed into a small part, between gripper jaws and in position over stretch block

300-Ton Stretch Press for

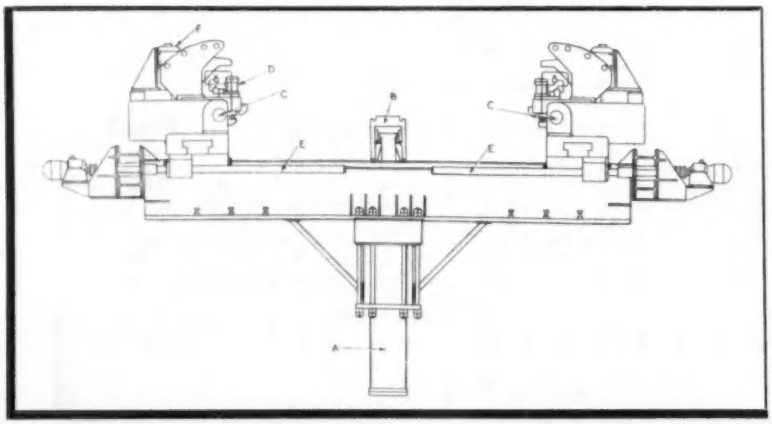
To supplement existing sheet metal forming facilities in connection with stepped-up production called for under the B-57A Canberra and other current warplane and missile programs, a new 300-ton Sheridan stretch press has recently been placed in operation at The Glenn L. Martin Co., Baltimore, Md.

The new machine, built by the Sheridan Iron Works of Champlain, N. Y., to specific requirements laid down by Martin tooling engineers, embodies a number of noteworthy features.

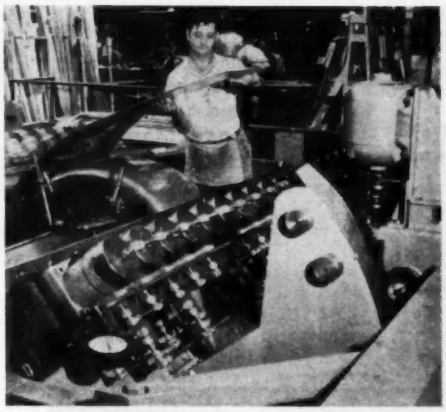
Highly accurate contouring of aluminum skins over stretch blocks is promoted by the automatic vertical-to-horizontal angulation of the opposing banks of gripper jaws. This maintains the grip continually at right angles to the line of stretch. The swivel type jaws, each bank of which exerts a pull of 150 tons, are adjustable for forming tapered shapes.

Another important innovation concerns the fact that the 100 in. long jaw banks are designed in one piece, each operating as a unit—with consequently high uniformity of pull, from end to end of the line of grip.

In addition, the jaws on this new machine can be



This elevation drawing of the Sheridan stretch forming machine shows (A) the table-ram cylinder, (B) the forming-die table, (C) the jaw pivot point, (D) the jaw operating cylinders, (E) the jaw operating leadscrews, and (F) the jaw-tilting motor. Drawing courtesy Aircraft Production (London).



of the Sheridan press. Jaws open a distance of ¾-in. for loading. Note heavy-duty motor in left background, which powers swivel action of jaws.

Third illustration gives closeup of die table, flanked by gripper jaws of Sheridan press, with completed part in position as formed over stretch block. Curved cheeks above openings of jaws increase radius of bend in sheet, outside of the trim line, to minimize tearing during die table's continued rise after ultimate angular position of jaws has been reached.

Increasing Canberra Production

parted a distance of 10 ft or brought together within two in. of each other. This latter feature permits forming of such hitherto difficult parts as narrow leading edges for aircraft wings.

In operation, the stretching force is applied by raising the die table on twin hydraulic rams, under control from a centrally located instrument console. The rams can be moved independently, and the table, which measures 98 by 18 in., can be extended to accommodate dies equal in length to the largest sheet widths that can be handled by the gripper jaws. The machine processes sheets up to 100 in. wide, at a high rate of output.

On the new press, heavier sheet gages can be handled than formerly was possible—and better quality work with fewer sheets torn during processing has been achieved since the Sheridan machine was installed. The operation requires two men—one to place the sheet in position and control the cycle, the other to remove and stack the finished parts. A number of manual operations have thus been wholly eliminated by reason of the new installation.

• • •

Radioisotope Projects

Presented herewith are the companies utilizing radioactive isotopes for research work on automotive and aviation projects according to a recent report of the Atomic Energy Commission listing all industrial radioisotope projects. The companies and descriptions of their projects follow:

ALABAMA

Reynolds Alloy Co., Listerhill—Use in beta-ray thickness gage for determining thickness of aluminum foil.

CALIFORNIA

C. F. Braun & Co., Alhambra—Radiography of welds.

North American Aviation, Inc., Downey—Study diffusion of carbon in graphite.

Shell Development Co., Emeryville—Study the mechanism of hydrocarbon isomerization, the Fischer-Tropsch reaction, the alkylation reaction and other catalytic and noncatalytic hydrocarbon reactions.

Aircraft X-Ray Laboratories, Huntington Park — Industrial radiograhpy.

X-Ray Products Corp., Los Angeles—Rodiography of weldments and castings.

Shell Oil Co., Martinez—Study the behavior of petroleum products in internal combustion engines.

General Metals Corp., Oakland—Radiography of steel, iron, and nonferrous castings.

California Research Corp., Richmond—Study the effect of various levels of ionization on the fundamental processes of combustion and the performance of fuels in internal combustion engines; investigate nature and location of sulfur deposits in Diesel engines; determine effect of composition of fuel on wear rate of plunger in fuel injector for Diesel engines; determine the disposition of various organic salts used in lubricants during engine tests; Determine with the aid of irradi-

(Turn to page 122, please)

News of the MACHINERY INDUSTRIES

By Thomas Mac New

Machine Tool Builders Planning New Equipment for Post-Defense Markets. Foreign Imports Offer Little Competition.

Imports Not Serious

After visiting several machine tool builders in the New England area, we found that the majority have not suffered any competition due to imported foreign machine tools, but they have been seriously hurt on the export market. They claim that the imported foreign tools offer little or no competition because most of them are standard items, whereas the American builders are primarily concerned with specialized tooling for defense. It's reported, however, that some specialized tooling has made its debut at the recent foreign shows. In relation to the export market, it is felt that this has been most seriously hampered by lack of American dollars in the foreign market rather than our defense program. In one rare instance, however, a machine tool builder has more foreign business, percentage-wise, than in any previous year since World War II.

Order Drop in '53 Expected

Some tool manufacturers are planning new equipment to take up any slack business when the defense program slows down. One company is currently experimenting with a piece of machinery that is totally alien to its regular field of endeavor. Other firms are experimenting with more carbide tooling, higher horsepowers, and new machine tool designs.

Cone Automatic Machine Co. is currently working with carbide tooling on its automatic bar machines. Cone engineers have found that they can obtain 10 times the tool life of HSS and six to eight times higher production. This rate, however, is not attributed entirely to the tooling but also to the higher horsepower, being used, which is providing higher spindle speeds and feeds. With a current setup, Cone can remove 1½ lb of steel from a work piece in 18 sec. As a matter of interest, the Cone automatic bar machine frame has been copied and is currently in production by the Russians.

Many of the builders are accepting unrated orders for tentative delivery, since it is believed that rated orders will taper off sharply during 1953. The delivery dates, in most instances, on nonrated orders, are scheduled for 1954. Of course, there are also exceptions to this, particularly where

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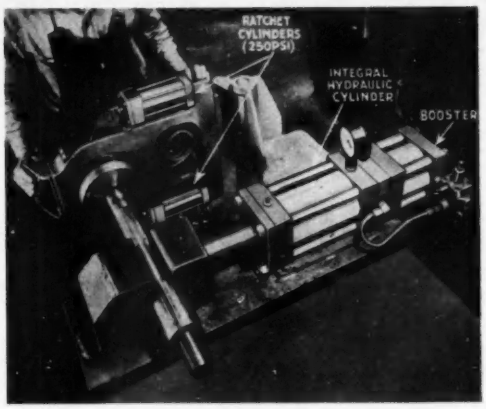


Holding polished chrome - plated steel piston rods tight at over 15 tons of clamping pressure to permit fast economical assembly of pistons and followers to the rod is the unusual job performed by this unique clamping device designed and built by Planet Products Corp., of Cincinnati in conjunction with Miller Motor Co., Chicago area manufacturer of air and hydraulic cylinders, boosters and accumulators. A small inexpensive hydraulic pump operating at only 250 psi powers the entire device. The 15 tons clamping pressure is obtained by use of a standard Miller 5 in. bore B4 fluid pressure booster with a booster ratio of 6.25 to 1 driving a Miller 5 in. bore high pressure hydraulic cylinder, the piston rod of which operates the movable, clamping member.

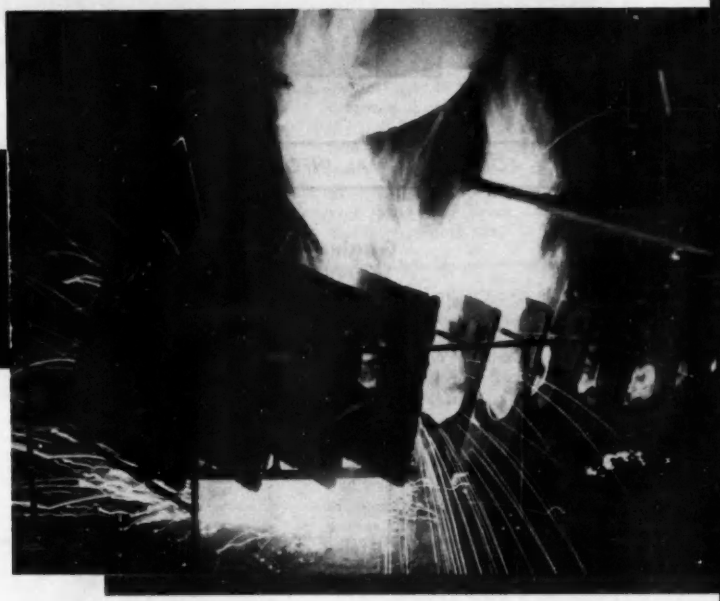
One of the largest self-contained oil-hydraulic extrusion presses—capacity 3000 tons—has been built by Hydropress, Inc., New York, N. Y. This new design provides for stepless adjustment of the extrusion speed from both the main operating pulpit and from an auxiliary control stand at the platen exit. The press with its induction heating furnace operates semi-automatically. It was specially designed for the extrusion of magnesium and magnesium alloys at the new plant of the Dow Chemical Co., at Madison, Ill.

Arrangements Complete

for

HUGE METAL CONGRESS

and Show



Pouring stainless steel at 3100 F into shell molds.

AMERICA'S great industrial event of 1952—the 34th National Metal Congress and Exposition—convenes this month in Philadelphia and attendance is expected to reach the 50,000 mark. Approximately 400 nationally-known firms engaged in either the production of metals, the treatment of metals, and the fabrication of metals into parts and components will have exhibits at the show, which opens October 20 at Philadelphia's Convention Hall and continues through October 24. Many of the new products and new equipment on display there are described and illustrated beginning on the next page in this issue of AUTOMOTIVE INDUSTRIES.

Organizations sponsoring the National Metal Congress and Exposition are the American Society for Metals, American Welding Society, American Institute of Mining and Metallurgical Engineers (Institute of Metals Division), and the Society for Non-Destructive Testing. Each will conduct technical meetings and other similar activities during the week at designated hotels in that city.

The American Society for Metals will hold its annual seminar October 18 and 19 on the subject, "Modern Research Techniques in Physical Metallurgy." During the next five days the society will sponsor morning, afternoon and evening sessions at which 31 technical papers and lecture courses will be featured. Ralph L. Wilson, director of metallurgy, Timken Steel and Tube Div., Timken Roller Bearing Co., and J. B. Austin, director of research laboratories, U. S. Steel Co., will take office on October 23 as President and Vice President, respectively. W. H. Eisenman, secretary, will succeed himself for the 18th consecutive two-year term. New ASM trustees are A. O. Schaefer, vice president in charge of engineering and manufacturing, The Midvale Co., and H. B. Knowlton, chief engineer, materials engineering, International Harvester Co. At the annual dinner that night the society's Gold Medal will be awarded to Dr. Robert F. Mehl, head, Department of Metallurgy, Carnegie Institute of Technology, and the ASM 1952 Medal for the Advancement of Research will go to Cleo F. Craig, president, American Telephone and Telegraph Co.

The seventh metallographic exhibit of the American Society for Metals at Convention Hall will feature 10 classifications of micros. Another special exhibit will be that of the Special Libraries Association, which will reproduce a working library and a metals librarian will be in constant attendance to locate answers to reference questions. The Monday afternoon session of the Special Libraries Association Metals Section will feature reports on the new metallurgical classification and mechanical methods for literature handling now in the experimental stage. Tuesday's meetings will deal with the availability of research reports, unclassified government material, and foreign language literature.

Highlighting the American Welding Society's 33rd National Fall Meeting, which opens October 20, will be

(*Turn to page* 96, *please*)

What's NEW AT THE NATIONAL METAL SHOW

October 20 to 24 PHILADELPHIA Pa.

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 65

Gaging System

On display for the first time is the "Micro-Step" gaging system, an integrated and related series of gaging items that reportedly makes it easy to use gage blocks directly in everyday gaging operations.

The nucleus of the system is a series of unique gage block holders and end standards which are used to construct innumerable gaging and layout setups up to 72 in. long in steps of 0.000025 in. A time-saving precalibrated dial indicator is also part of the system and is used with the holders and end standards for constructing precise indicating type gages.

Other components of the system on exhibit include five in. and 10 in. sine plates and the "Height-Combination Tables—Heat Expansion Calculator" book which lists directly the gage blocks to be used in forming 10,000 different dimensions and which gives the correction to be made when checking non-steel parts with gage blocks, at temperatures above or below 68 F. *The DoALL Co., Booths 524 and 623.*

DoALL gaging system

Circle MS-1 on page 65 for more data

Reverberatory Furnace

Operating improvements for melting of ferrous and non-ferrous metals are said to be provided by the recently developed non-crucible, direct-fired reverberatory furnace. Operations show that a melt of from 1200 to 1500 lb of steel scrap is tapped within 30 min., depending on the size of scrap gates and risers (weighing from 10 to 150 lb). Fuel consumption averages 55 to 60 gal per hr.

The hopper in which the metal is charged has a restricted opening at the bottom to prevent cold metal from contacting the molten metal. The non-crucible, direct-fired furnace is claimed to be equally efficient for large or small heats. Fired by oil or gas fuels, it can be built to meet specified requirements. Standard models, with bath capacities ranging from 300 to 4400 lb, are now in production. *Eclipse Fuel Engineering Co. Booths 1926, 1601, 1310.*

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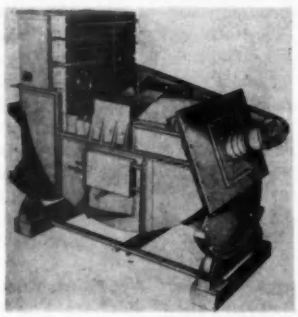

Eclipse reverberatory furnace.

Aluminum Etchant

Oakite Composition No. 60, a material designed to produce a heavier, more uniform etch on aluminum, will be exhibited.

Among the advantages reported to be brought to aluminum-etching operations by this material are: rapid etching any desired depth with a velvet-like appearance imparted to the surface; elimination of hard scale build-up on tanks and heating coils, leaving only a light, soft sludge easily removed by a hose rinse; consistent, uniform etching without excessive foaming or fuming; long-life working solutions; and readily workable solutions that do not become clouded with suspended matter. It is claimed that parts rinse readily in cold or hot water after etching. *Oakite Products, Inc., Booth No. 1715.*

Circle MS-3 on page 65 for more data

Welding Machines

Industrial models of a-c welding machines in 300, 400, and 500 amp capacity will be featured. The new design replaces previous 300 and 500 amp machines and incorporates new features as well as mechanical changes.

This compact design has the same high output and overload capacity as previous models and incorporates the arc booster circuit.

All electrical and mechanical control parts required for connecting or that need maintenance are accessible without removing the case. Reconnection of the input circuit for 220 or 400 v can be done without replacing any coils. An improved downdraft ventilation system brings air in from the top of the case, circulates it by baffles through the windings and prevents any air from being recirculated. The large lift bale on top of the case accommodates a standard crane hook. *Lincoln Electric Co., Booth 140.*

Circle MS-4 on page 65 for more data

Flame Plated Tungsten Carbide

Tungsten carbide is currently being flame-plated in a thin coating at 400 F. A wide variety of metals can be flame-plated, and several of these will be on display. Flame-plated coatings can be applied over a wide range of sizes and shapes, according to the company.

Hardness of flame-plated tungsten carbide coatings (92 per cent tungsten carbide; eight per cent cobalt) averages about 1350 Vickers pyramid number (VPN). This is equivalent to 89.3 Rockwell (A scale). Almost all of the hardness tests on coatings give values of from 1200 to 1500 VPN, using a 300 gram load.

Modulus of elasticity of flame-plated tungsten carbide is 15,000,000 psi. Flame-plated tungsten carbide has less than 0.5 per cent porosity.

Because of the bond between individual particles, low modulus of elasticity, and thinness of coating, the stresses induced in flame-plated tungsten carbide by a given temperature differential are said to be low. Thermal shock of a moderate rate and below about 2000 F has no effect on the coating. Most satisfactory resistance is obtained with thicknesses not greater than 0.003 in., after grinding. *Linde Air Products Co., Booth 1202.*

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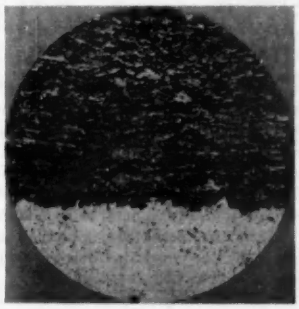

Photomicrograph of a flame-plated tungsten carbide coating at 300 magnifications. The applied coating is the dark area, while the lighter zone shows the mild steel base. The jagged bond line between the two materials indicates the cleaned, slightly roughened surface that was coated. Notice the interlocking mechanical bond. There is no mixing or dilution of the coating with the base. The coating has a fine-grain, dense, laminar structure with negligible porosity.

Test Instrument

Notable among a complete range of electronic test instruments to be displayed is Type FS-200 Magnatest unit which permits high-speed sorting of small parts by variations of hardness, or in size, or because of the presence of cracks. Parts are dropped through the coil at the rate of several thousand per hour, and the instrument is adjusted to sort them in three groups, such as "below size," "correct size," and "over size." *Magnaflux Corp., Booth 537.*

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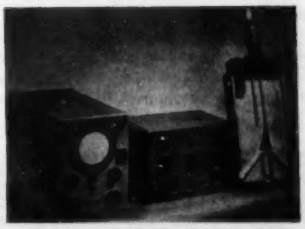

Magnaflux FS-200 test instrument.

Grinding and Polishing Machine

Curtis grinding and polishing machine, Model 600.

High speed grinding and polishing machines for flat coil, strip bars, blanks and components will be exhibited. These Model 600 machines handle material up to 10 in. wide and three in. thick.

Each unit utilizes the abrasive belt grinding and polishing principal. Models are available for surfacing one or both sides of the material.

These machines have an infinitely variable speed between 20 and 60 fpm. *Curtis Machine Div., Lincoln Park Ind., Inc., Booth 937.*

Circle MS-8 on page 65 for more data

(*Turn to page 58, please*)

Versatile Batch Furnace

A batch furnace, capable of case and homogeneous carburizing, dry cyaniding, clean hardening and carbon restoration at high production rates, will be on display.

Available in two capacities, 500 and 1600 lb/hr gross, this Allcase furnace is said to embody the versatility and economy of the standard type heat treat furnace with the high production rates inherent in specialized units. A wide variety of parts are being treated in a number of installations.

The operating temperature range is 1450 to 1750 F, utilizing radiant tube heating elements and a forced convection recirculating fan. A special enclosed quench chamber permits rapid direct quench under controlled atmosphere conditions. *Surface Combustion Corp., Booth 231.*

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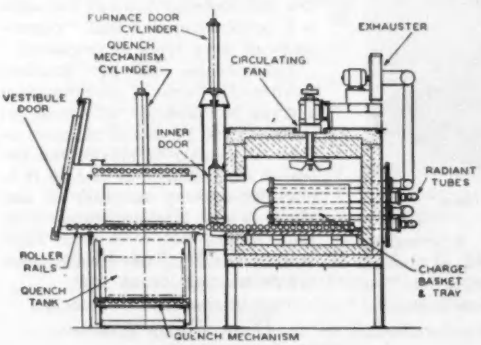

Surface Combustion batch furnace.

For additional information, please use postage-free reply card on page 65

(*Continued from page* 57)

Liquid Flame Heating

To be demonstrated is a salt bath furnace which is said to be particularly useful for selectively heating the rim or edges of circular objects, hardening teeth on gears or sprockets, and any other products that require peripheral heating.

In operation, either a neutral type salt bath or a carburizing bath, heated by the internal electrode system, is maintained automatically at the specific temperature to which the work is to be heated. A number of the parts, such as gears, to be selectively heated can be mounted on a shaft within a suitable fixture which is placed over the salt bath. Only that portion of the periphery to be heated (such as the teeth) are immersed in the bath; the work is then rotated. *Ajax Electric Co., Inc. Booth 624.*

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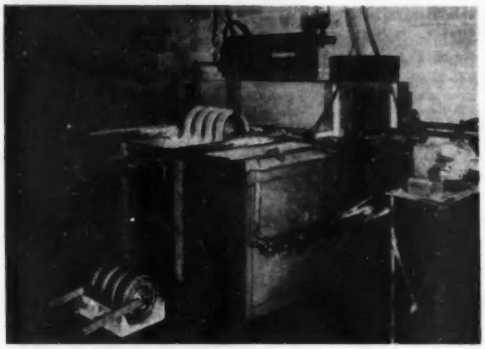
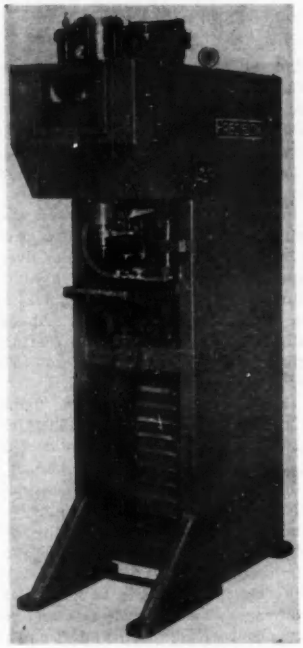


Ajax salt bath furnace.

Welder



This precision magnetic head welder provides a direct relationship between current and pressure. Quality welds in critical applications, such as electrical contact welding and aluminum crosswire welding, are thereby claimed to be obtained. (Precision Welder and Flexopress Corp. Booth 842.)

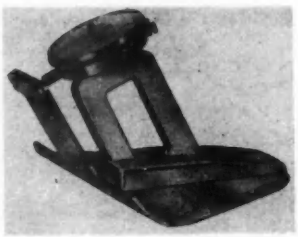
Circle MS-11 on page 65 for more data

Sheet Metal Draw Tester

Model B-1 Flex-Tester performs a non-destructive test on sheet metal to determine its comparative drawing qualities and its stretcher strain characteristics. Developed by the General Technical Department of Jones & Laughlin Steel Corp., the unit has been proven in the corporation's own mills and in automotive stamping plants.

The tester is used to bend the corner of a sheet through a standard arc, measuring on a dial indicator the resistance of the steel to the bending operation. The test procedure is set up using 0.035 in. thickness as a standard. A conversion device, furnished with the tester, enables the operator to convert dial readings obtained on different gages of material to this standard for the purposes of comparison.

The instrument can be used successfully on gages up to 0.050 in. Research has shown that a Flex (or "F") value in the low 50 range indicates the best of drawing quality. As test values become progressively higher, the drawability of a material gradually decreases. *Steel City Testing Machines, Inc., Booth 1416.*



Steel City Flex-Tester.

Circle MS-10 on page 65 for more data

Impact Testing Machine

Riehle Model PI-2 impact testing machine is an improved unit suitable for Izod, Charpy, and tension impact tests, in accordance with ASTM Designation E-23. Changing from one test to the other is accomplished by inserting the proper striking edge into the pendulum hammer. The anvil is a combination unit that accommodates all three types of specimens.

The machine has two standard positions for height of pendulum drop and can be furnished with three interchangeable pendulum hammers of different weights to provide the following scale ranges: 30 and 60 ft lb with low-capacity hammer; 60 and 120 ft lb with intermediate hammer; and 120 and 240 ft lb with high-capacity hammer. *American Machine and Metals, Inc. Booth 1239.*

Circle MS-12 on page 65 for more data

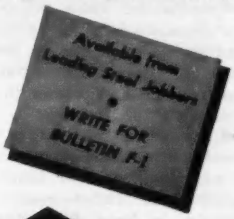
(*Turn to page* 60, *please*)

INLAND 4®-WAY SAFETY PLATE

Safety pays off—in personnel, plant and product! You gain man-hours, lower insurance rates, greater fire protection and happier workers.

Each danger spot indicated above can be easily, quickly and economically made *safe* with slip-resistant 4-WAY SAFETY PLATE. It adds strength, traction and provides quick starts and stops.

Use 4-WAY SAFETY PLATE for sure footing on all danger spots in your plant and as standard equipment on your product.



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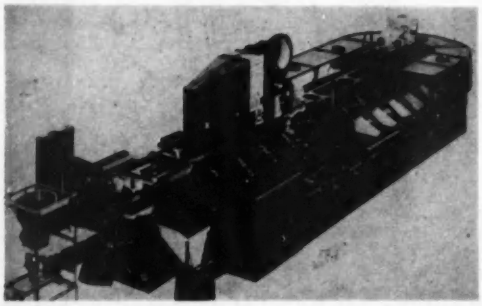
For additional information, please use postage-free reply card on page 65

(*Continued from page 58*)

Automatic Plating Machine

A full automatic barrel plating and processing machine, now available, will be on display. Material to be plated or coated is passed through various cycles of operation completely automatically. At no point will a worker be required to lift, carry or handle any of the material being processed. *Frederic B. Stevens, Inc., Booth 244.*

Circle MS-13 on page 65 for more data



Stevens automatic barrel plating and process machine.

Bending Machine

Among a line of precision metalworking machines to be exhibited will be a hand-operated bending machine which bends up to one-in. diam cold finished steel bar and 1¼ in. tubing or their equivalents. Designated Di-Acro bender No. 4, it is said to be designed for heavy bending operations where production does not warrant a power-driven machine. It offers a radius bending range from zero to 12 in.

A feature of the machine is a built-in ratchet mechanism which can be engaged or disengaged by the operator, depending upon the size of the material being formed. Engaging the ratchet mechanism increases the material capacity of the bender—larger and heavier size material can be bent—and multiplies the operator's effort by approximately four times. By disengaging the ratchet—operating the bender in direct drive—the operator can step up the production of lighter materials.

The machine can be quickly changed over from one forming operation to another. It provides a method of producing one or many, simple or complicated parts without the cost of dies, according to the manufacturer.

O'Neil-Irwin Mfg. Co. Booth 630.

Circle MS-14 on page 65 for more data

O'Neil-Irwin Di-Acro Bender No. 4.

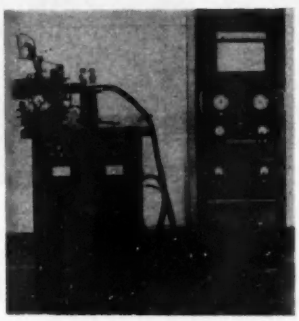
Fluorescence Analysis Unit

The Norelco fluorescence analysis unit which incorporates many design improvements to facilitate rapid qualitative and quantitative analysis of constituents in metals, alloys, minerals, ores, chemical mixtures and compounds, is now in production.

Specimens under analysis are exposed to an intense beam of exciting X-radiation. This results in individual X-radiations being generated by elements susceptible to such excitation. The combined radiations representing the various constituents are passed through a special collimating system to a crystal which serves as an analyzer and which, by proper positioning, reflects each of the individual radiations at a specific angle. Intensities are measured by means of a Geiger counter, arranged together with the crystal and its angulating mechanism on a specially designed goniometer. Data obtained from this system may be evaluated in terms of percentages of the elements present.

The fluorescence analysis unit employs a wide range vertical goniometer with a sweep radius of 170 mm instead of the horizontal assembly used on the original model. The equipment utilizes a horizontal, water-cooled oil-insulated X-ray tube operated from a standard water-cooled Norelco diffraction unit. *North American Phillips Co., Inc., Booth 1861.*

Circle MS-15 on page 65 for more data



North American Phillips fluorescence analysis unit.

Liquid Carburizer

A liquid carburizer—Perliton 396—is to be demonstrated with a complete operating salt bath exhibit including quenching, cleaning in hot water and rust prevention. This carburizer is soluble in water. *E. F. Houghton & Co., Booth 724.*

Circle MS-16 on page 65 for more data

(*Turn to page 126, please*)

for fast assembly...

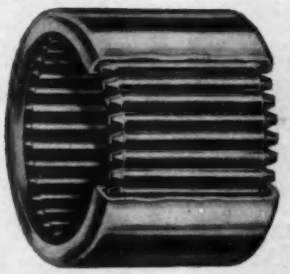
Torrington Needle Bearings are "naturals" for fast assembly line operations. Here's why:

They are complete, compact units, ready for instant installation.

No time is wasted producing complex housings—a straight bore, machined to size, is all that's needed.

A simple arbor press operation seats Needle Bearings by press fit—no spacers or retainers are required.

The high radial load capacity, compact size, light weight and other advantages of Needle Bearings help improve product efficiency. Why not get the whole story from your Torrington engineer today?



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NEW EQUIPMENT PLANT • PRODUCTION

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Electronic Temperature Controller

For controlling operating temperatures ranging from minus 100 F to plus 600 F, Thermo Electronic temperature controllers using resistance bulb sensitive elements have been brought out. These instruments are built with single or duplex control action and are available in six different temperature ranges. The instrument has a relay with load contacts for operating heating elements, motor starters, electric valves, and signal contacts for the two red and green lights on the instrument door. These signal lights are said to be visible over a wide angle at distances up to 100 ft.

When the temperature at the resistance bulb deviates 0.1 F from the control point setting, the instrument takes corrective action. The control action is continuous.

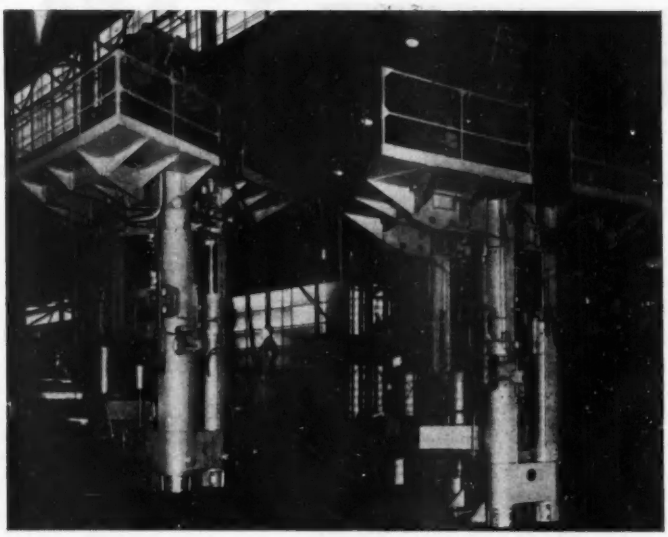
Calibration of the measuring circuit is accurate within ±0.25 per cent of the scale range. This accuracy is maintained by stabilized manganin wire resistors.

The control relay is the only moving part in this instrument, which operates completely on a-c current. Standard vacuum tubes are used in the electronic circuit. Controllers are suitable for flush panel or wall mounting. *Thermo Electric Co.*

Circle E-1 on page 65 for more data

Thermo electronic temperature controller.

Cartridge Case Heading Presses



The press at the left is a 2500-ton cartridge case heading press and the press at the right is a 1500-ton cartridge case pre-heading press. These cartridge case heading presses are equipped with special controls which permit heading steel or brass cases. Each press is equipped with a shuttle feed which operates automatically from front to back and a tool slide on the main platen, which also operates automatically, making possible a one or two hit heading operation by means of push buttons and selector switches. The shell is automatically ejected as the shuttle moves out of the press. A duplicate control station at the rear of the presses permits two operator control. (Hydraulic Press Mfg. Co.)

Circle E-2 on page 65 for more data

Air Drill

Gurmendi air drill unit, now available, contains a hydraulic monitor which is said to result in quick approach to the work, positive adjustable rate through the work, with no danger of break through, and rapid return.

The unit has positive stop adjustments on both forward and return strokes. Stroke is a full two in. with controlled feed of 1¼ in. (Alkon Products Corp.)

Circle E-3 on page 65 for more data

MINNEAPOLIS
Sept. 29, through Oct. 1.

MILWAUKEE
Oct. 7, through Oct. 10.

ST. LOUIS
Sept. 23, through Sept. 26.

BUFFALO
Oct. 29, through Oct. 31.

NEW HAVEN
Nov. 11, through Nov. 13.

BALTIMORE
Nov. 18, through Nov. 20.

NEWARK
Nov. 4, through Nov. 7.

CINCINNATI
Oct. 21, through Oct. 23.

WINSTON-SALEM
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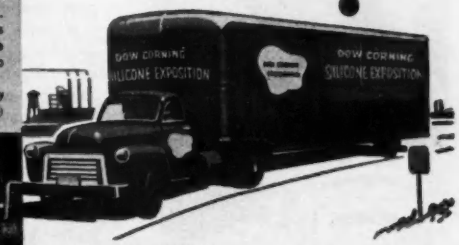
INDUSTRIAL MARKETING (June 1952)

"NEXT TO THE GREATEST SHOW ON EARTH . . . We could go on . . . reciting the fantastic properties of Silicones, but just as breathtaking as the materials were the display techniques used to demonstrate them . . ."
CIRCUIT RIDER (Vol. 6, No. 2, published by Electrical Construction and Maintenance)

". . . Heat Stability Plus: Visitors . . . see, among other demonstrations, how Silastic (Dow Corning's silicone rubber) remains soft and flexible at temperatures far above the limits of organic rubber . . ."
CHEMICAL WEEK (Jan. 26, 1952)

"IF YOU HAVEN'T already seen it, don't miss it when it comes around . . ."
POWER ENGINEERING (May 1952)



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NEW PRODUCTS

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 65

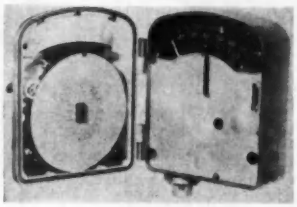
Seven-Ton Farm Truck Body Hoist

Now available is a seven-ton farm truck body hoist, for use with 1½ to two-ton trucks. A simple direct-lift design is said to assure trouble-free operation, while a minimum of moving parts means low maintenance cost.

Mounting time of the Jumbo Twin, as the hoist is called, has been reduced approximately 50 per cent. Adjustable wrap-around type longbeams permit easy mounting regardless of chassis width. The unit has a total gross weight of 450 lb.

A feature of the hoist is the Hydra-Clutch Pump. It is fan belt driven and requires no power-takeoff, according to the maker. Weighing only 37 lb, this needle-bearing pump reportedly requires but two or three hp to raise its capacity load. A dash-controlled clutch permits pulley to ride free, without driving pump, when not in operation. *National Lift Co.*

Circle P-5 on page 65 for more data

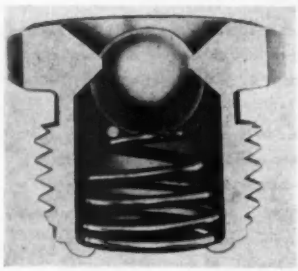


Improved Tachograph Model

Now available is an improved Model AA tachograph used for analyzing vehicle operation and movement. Design and construction changes include improvements in appearance, easier setting of warning light, a more durable case and mechanism, and more readable instrument face.

The case is cast aluminum with a metallic gray finish. Clock face, speedometer, and odometer are lighted for better vision. The tachograph chart is easily inserted on rectangular stud. *Automotive Div. Wagner Electric Corp.*

Circle P-6 on page 65 for more data



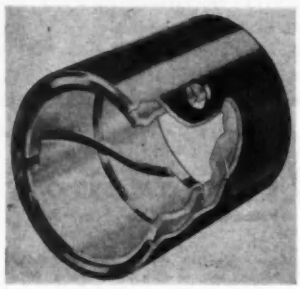
Flush-Type Grease Fitting

A line of flush-type grease fittings has been introduced for use on machinery where protruding fittings are undesirable. The head of the flush-type fitting is said to present negligible obstruction or opportunity for collision that might knock it off and impair the machine's function.

The fitting is made with a ball check. Supported by a spring, the ball reportedly prevents oil or grease leakage caused by back pressure. The ball, which holds the opening normally closed and cannot be unseated, is depressed for oiling or greasing.

The back-up spring is designed so passage through it at the point of fullest depression is greater than the opening at the top of the fitting. This provides free flow of lubricant. *Universal Lubricating Systems, Inc.*

Circle P-7 on page 65 for more data



Small Nylon-Lined Bearings

Nylon-lined bearings now available consist of a thin, drawn steel outer sleeve and a free-floating liner of DuPont FM 10001 nylon. They are initially being offered in 10 sizes ranging from ¼ in. to 1¼ in. ID.

These bearings are said to resist poundout, decrease friction, permit dry operation, damp mechanical vibration, and minimize abrasion failures. They are corrosion-resistant and can be operated submerged in most liquids, according to the makers.

The nylon liner, which is an instantly replaceable bearing surface, is provided with a spiral compensation gap that compensates for dimensional changes in the circumference due to expansion and contraction. This gap also serves to distribute lubricant in an axial direction. *Thomson Industries, Inc.*

Circle P-8 on page 65 for more data

Free INFORMATION SERVICE

Postage-Free Postcards Are Provided Here for Your Convenience to Obtain FREE LITERATURE and Additional Information on NEW PRODUCTION AND PLANT EQUIPMENT, AND NEW PRODUCTS Described in This Issue of AUTOMOTIVE INDUSTRIES. Please Circle Code Numbers of Items in Which You Are Interested, Print Name, etc., and Mail Promptly for Quicker Service.

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FREE LITERATURE

Remote Controls

Bulletin No. 20-106, including a special insert on application data, and Bulletin No. 20-106-F describe a line of hydraulic remote controls with specifications for both the "F" and "H" series. The rated capacity of the former is 400 in. lb pressure stroke and 125 in. lb return stroke. *Sperry Products, Inc.*

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Freezers and Test Units

Now available is a brochure describing a broad line of complete temperature range testing units and low-temperature industrial freezing units. Specifications are given for 36 standard models. *Industrial Freezer Div., Webber Appliances Co., Inc.*

Circle L-2 on postcard for free copy

Testing Machine

Bulletin No. 4202 presents Model FGT Baldwin-Emery SR-4 testing machine of 50,000 lb capacity. *Baldwin-Lima-Hamilton Corp.*

Circle L-3 on postcard for free copy

Precision Castings

Presented in an eight-page booklet are design and engineering data on Hyprecision castings. Basic tolerances are plus or minus .005 in. per dimensional inch. *The Sessions Foundry Co.*

Circle L-4 on postcard for free copy

Metalworking Machines

A 32-page catalog describes how Di-Arco metalworking machines perform a wide variety of forming, cutting, and punching operations in medium and light weight materials. Machine specifications and material-forming capacities are arranged in tabular form for ready reference. *O'Neil-Irwin Mfg. Co.*

Circle L-5 on postcard for free copy

Insulating Materials

An eight-page brochure describes a line of electrical insulating materials. Among them are varnishes, Glyptal finishes, varnished cloths and tapes, sealing and filling compounds, and silicones. *Chemical Div., General Electric Co.*

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Sand Conveyor

The Whirl-Air-Flow, a pneumatic pipeline system for moving foundry sand, is described in a four-page leaflet. *Gerwin Industries.*

Circle L-7 on postcard for free copy

Bearing Lubrication

Problems of ball bearing lubrication and maintenance are discussed in an eight-page brochure. Illustrations of bearing and housing design are shown. *The Fafnir Bearing Co.*

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(Please turn page)

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FREE LITERATURE				NEW METAL SHOW PRODUCTS					NEW EQUIPMENT		NEW PRODUCTS	
L-1	L-7	L-13	L-19	M-1	M-7	M-13	M-19	M-25	M-31	M-37	E-1	E-7	P-1	P-7
L-2	L-8	L-14	L-20	M-2	M-8	M-14	M-20	M-26	M-32	M-38	E-2	E-8	P-2	P-8
L-3	L-9	L-15	L-21	M-3	M-9	M-15	M-21	M-27	M-33	M-39	E-3	E-9	P-3	P-9
L-4	L-10	L-16	L-22	M-4	M-10	M-16	M-22	M-28	M-34	M-40	E-4	E-10	P-4	P-10
L-5	L-11	L-17	L-23	M-5	M-11	M-17	M-23	M-29	M-35	M-41	E-5	E-11	P-5	P-11
L-6	L-12	L-18	L-24	M-6	M-12	M-18	M-24	M-30	M-36	M-42	E-6	E-12	P-6	P-12

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Hydraulic Cylinders

Now available is a 28-page bulletin (No. 701) on a complete line of hydraulic cylinders. The different mounting types and capacities of cylinders up to 1500 psi and 3000 psi working pressure are described. *Lindberg Engineering Co.*

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Power Presses

Bulletin No. 52 contains complete specifications on 15 models of inclinable 16 to 90-ton capacity power presses and three models of the Hydra-Shear machine for shearing up to 10-gage steel metal. *Johnson Machine & Press Corp.*

Circle L-10 on postcard for free copy

Temperature Controllers

An eight-page catalog section (No. 55) illustrates and describes a line of signaling temperature controllers and resistance bulbs. *Thermo Electric Co., Inc.*

Circle L-11 on postcard for free copy

"O-Rings"

Brief but comprehensive data on manufacture and application of "O-Rings" as static and dynamic seals are contained in a 16-page booklet. Groove machining details for static and dynamic applications are given in chart form. Properties and characteristics of the basic polymers are outlined. *International Packings Corp.*

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USE THIS POSTCARD

Industrial Hose

Specifications of industrial hose assemblies, couplings, stems, swivels and accessories are contained in Catalog No. 52. *J. N. Fauver Co.*

Circle L-13 on postcard for free copy

Industrial Tires

Recently released is a 12-page booklet on an industrial tire line. Numerous service and maintenance tips are included. *B. F. Goodrich Co.*

Circle L-14 on postcard for free copy

Centrifugal Pumps

Recently released is a bulletin covering general-purpose centrifugal pumps of the cradle-mounted type. Five basic cradle groups and 17 corresponding pump types are covered. *Ingersoll-Rand Co.*

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Fork Lift Trucks

Bulletin No. 5126B describes a series of fork lift trucks in capacities from 4000 to 10,000 lb. They are available with either gas or Diesel power plants. *Philadelphia Div., The Yale & Towne Manufacturing Co.*

Circle L-16 on postcard for free copy

Gas Compressors

Now available is a catalog covering Model HMA compressors. While primarily designed for the petroleum industry, they are said to be suitable for heavy construction projects using bottled propane as a fuel. *Clark Bros. Co.*

Circle L-17 on postcard for free copy

Industrial Filters

Information on industrial applications of the Delpark industrial endless belt type filter and the Delpark industrial disposable type filter is now available in an illustrated brochure. Included is information on the sizes, capacities, and performance characteristics of these filters. *The Industrial Filtration Co.*

Circle L-18 on postcard for free copy

Metal Treating

Bulletin No. 39 describes the possibilities of using peroxygen compounds in the treatment of metal surfaces. *Becco Sales Corp.*

Circle L-19 on postcard for free copy

Induction Heating

Now available is a 25-page bulletin on THER-MONIC induction heating facts. *Induction Heating Corp.*

Circle L-20 on postcard for free copy

Fuel Consumption

Now available is a limited supply of reprints of an article entitled "Lower Unit Fuel Consumption a National Need." *Automotive Industries.*

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(*See preceding page*)

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FREE LITERATURE				NEW METAL SHOW PRODUCTS				NEW EQUIPMENT	NEW PRODUCTS
L-1	L-7	L-13	L-19	M-1	M-7	M-13	M-19	M-25	M-31	M-37	E-1	E-7	P-1	P-7
L-2	L-8	L-14	L-20	M-2	M-8	M-14	M-20	M-26	M-32	M-38	E-2	E-8	P-2	P-8
L-3	L-9	L-15	L-21	M-3	M-9	M-15	M-21	M-27	M-33	M-39	E-3	E-9	P-3	P-9
L-4	L-10	L-16	L-22	M-4	M-10	M-16	M-22	M-28	M-34	M-40	E-4	E-10	P-4	P-10
L-5	L-11	L-17	L-23	M-5	M-11	M-17	M-23	M-29	M-35	M-41	E-5	E-11	P-5	P-11
L-6	L-12	L-18	L-24	M-6	M-12	M-18	M-24	M-30	M-36	M-42	E-6	E-12	P-6	P-12

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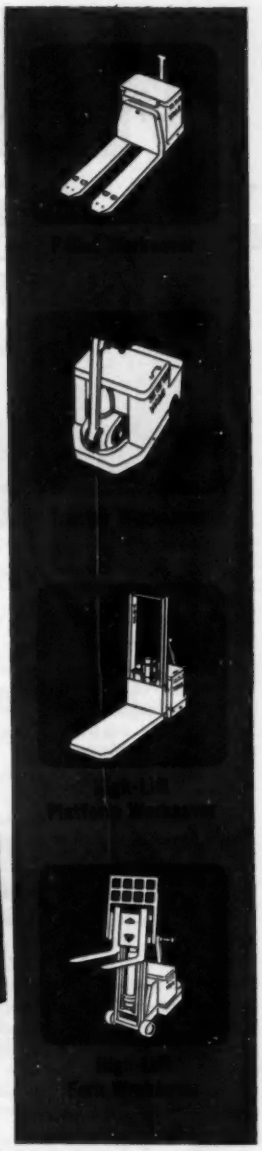

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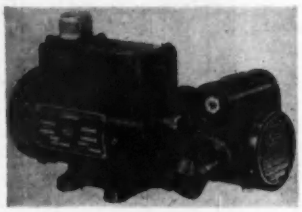
In Canada write: Yale & Towne Mfg. Co., Box 337—Postal Sta. "A", Toronto

YALE GAS AND ELECTRIC TRUCKS • YALE WORKSAVERS • YALE HAND TRUCKS • YALE HAND AND ELECTRIC HOISTS • YALE PUL-LIFTS

NEW AIRCRAFT PRODUCTS

FOR ADDITIONAL INFORMATION, please use postage-free reply card on PAGE 65



Lear Model RG-9540 fuel pump.

Heater Fuel Pump

Now available is a continuous-duty electric-driven fuel pump that feeds fuel to aircraft heating and de-icer systems. The combustion heater fuel pump, Model RG-9540, has a rated capacity of 35 gph at 25 psi discharge with 20 in. Hg absolute inlet pressure.

The pump is positive displacement, non-pulsating, rotary vane type. It is equipped with an adjustable, balanced-type, relief valve which maintains uniform discharge pressure from sea level to 40,000 ft. A by-pass valve is also included in the pump. It is designed for use with straight aviation gasoline and high aromatic blends and operates efficiently in hot or extreme cold conditions of —65F.

A motor drives the pump directly at 3700 rpm. Motor is 0.06 hp, 27-v, d-c, continuous-duty, compound-wound, 3.5 amp, and explosion-resistant with fan cooling. Radio interference filter is built in.

The unit weighs 3.4 lb and is approximately 7½ in. long. The inlet and outlet ports are tapped 7/16-20 NF-3 straight threads, which is also the size of the seal drain boss. Electrical power is connected through an AN3102 electrical receptacle attached to the motor. *Romec Div., Lear, Inc.*

Circle P-1 on page 65 for more data

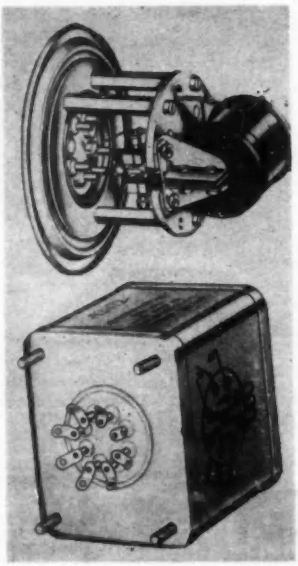
Synchronous Inverter

Recently placed on the market is a synchronous inverter that can reportedly be operated at any frequency from 0 to 3500 c unaffected by shock and vibration. This inverter is said to be capable of converting low-power d-c signals, as low as 0.05 microvolts, to alternating voltages that can be amplified and applied to electronic, electrical and servo systems.

The Syncroverter Switch, as the device is called, is designed for precision use on high-altitude or surface applications in aircraft, guided missiles, gun directors, electronic computors, instruments, and many other similar devices.

Errors due to thermal emf are eliminated by the use of two spdt contacts. The contact-carrying armatures are said to be of such low mass that their mechanical response is practically instantaneous. The device is hermetically sealed against dust and corrosion. *The Bristol Co.*

Circle P-2 on page 65 for more data



Bristol Syncroverter Switch.

Micro Switch small toggle switch.

Small Toggle Switches

A series of extremely small toggle switches, designed primarily for use in assemblies where switching components must be located in unusually small space, is announced. They are developments of the firm's subminiature switch, ISMI.

One assembly (identified as 6AT2), is a single-pole, double-throw assembly which employs one ISMI switch riveted into a stainless steel toggle bracket. Another (6AT3), includes two basic ISMI switches and gives double-pole double-throw service

Toggle bushings are threaded and fitted with hex nuts for panel mounting. Detents are provided in the toggle mechanism in both the actuated and the un-actuated positions of the toggle.

Electrical ratings of the ISMI basic switch in these assemblies are given tentatively as follows: motor or resistive load, two amp 20 v d-c; inductive load at sea level, two amp 30 d-c; inductive load at 50,000 ft, 1½ amp 30 d-c; five amp 125 or 250 v a-c. *Micro Switch, Div. Minneapolis-Honeywell Regulator Co.*

Circle P-3 on page 65 for more data

Anti-Icing Compound

A non-combustible wing anti-frosting and de-icing compound is said to eliminate fire hazards completely. Stratofrost B, as the compound is called, is available in 53-gal drums. *Fine Organics, Inc., Aviation Industrial Chemicals Div.*

Circle P-4 on page 65 for more data

HUDSON

USES Sealed Power KromeX

FULL-FLOW RING SETS

FOR REPLACEMENT SERVICE

BUILT BETTER TO WEAR BETTER

HUDSON MOTOR CAR COMPANY · GENUINE PARTS ·

Chrome-Faced, Chrome-Alloy Top Compression Ring

Note Mechanical Interruptions

This cross-section micro-photograph shows solid chrome face, factory-lapped to a light-tight finish for quick seating, and mechanically interrupted for extra oil-carrying capacity. Sides of ring are Granosealed for quicker seating and greater flexibility.

MD-50 STEEL OIL RING

Now Better Than Ever!

NEW: Chrome-faced rails for double mileage!

NEW: Granosealed rail sides for greater flexibility!

The only ring with the ***FULL-FLOW SPRING!***

Repeatedly proved best for OIL CONTROL

EVEN IN

BADLY TAPERED

AND

OUT-OF-ROUND BORES

- **CAN'T BLOCK ANY PISTON OIL HOLES!**
- **CAN'T BLOCK ANY RING SLOTS!**
- **TWICE THE USUAL BEARING AREA for easier starting and longer life!**

All rings in KromeX RING SETS are beveled, tapered, or finished to thread-line contact for quick seating and blow-by control.

A PREMIUM PISTON-RING SET FOR HUDSON CARS

HUDSON Sealed Power PISTON RING SETS

Are engineered for better fit and longer wear

The BUSINESS PULSE

Balance Between Supply and Demand in Steel May Be Realized by End of First Quarter of 1951. Retail Sales Running Above Comparable 1951 Levels, With Improving Conditions Foreseen Over Remainder of Year.

This Survey Is Prepared Exclusively for AUTOMOTIVE INDUSTRIES by the Guaranty Trust Company of New York.

Index of Business Activity Rising

The resumption of the flow of steel from mills to users has been widely reflected in business indicators. The Federal Reserve Board's index of industrial production, which had fallen to a low of 193 per cent of the 1935-39 average in July, recovered to 215 in August. A preliminary estimate for September places the index at 223 per cent of its base-period average, which is equal to the previous postwar high attained in April of this year.

Likewise the index of business activity compiled by the Guaranty Trust Co., which includes trade as well as output series, registered an increase of more than four per cent from July to August, influenced largely by substantial gains in freight carloadings, cotton consumption and department store sales.

By the third week of September steel production itself had fully recovered to its pre-strike level. By that time the industry was producing at more than 100 per cent of theoretical capacity, and the expectation is that it will maintain this operating rate for many weeks to come. This swift recovery has largely dispelled earlier fears that the country might be in for an extended period of serious steel shortage.

Iron Ore Shortage Unlikely

Indeed, the belief is growing that a rough balance between supply and demand in steel will be realized sometime around the end of the first quarter of next year, except for a few special items. Underlying this belief—in addition to the swift recovery in steel-mill output—is the fact that a shortage of iron ore next spring is now considered improbable in view of the heavy tonnages currently being hauled by Great Lakes vessels. The expectation that a balance will be approached early next year is reflected in steel markets, where demand for quick-delivery steel is currently very strong, while less interest is shown in steel to be delivered after the end of this year.

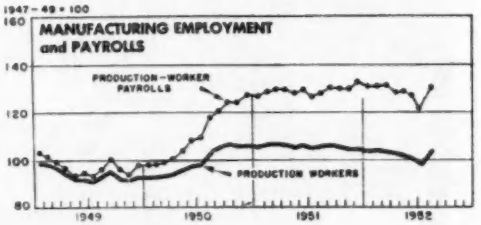
Employment totals also reflect the recovery in steel production. Between mid-July and mid-August the number of workers employed in non-agricultural establishments rose by nearly 900,000 to 46.9 million, a new high for the month. Employment in manufacturing industry alone increased by 700,000, in response to seasonal expansion in food-processing and soft-goods industries as well as recovery in steel and metal-working plants. By the end of August, workers applying for unemployment benefits had dropped to a postwar low for the month, indicating that nearly all those idled by the strike were back on the job.

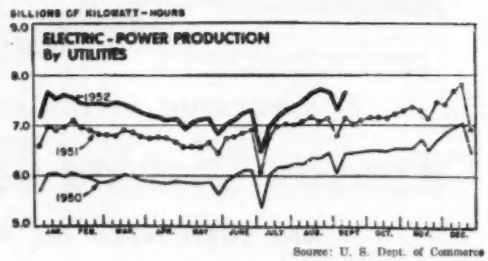
Retail Sales Increase

In the retail-trade field, merchants are generally optimistic and apparently anticipate gradually improving conditions over the remainder of the year.

(*Turn to page* 116, *please*)

Selected Business Indicators



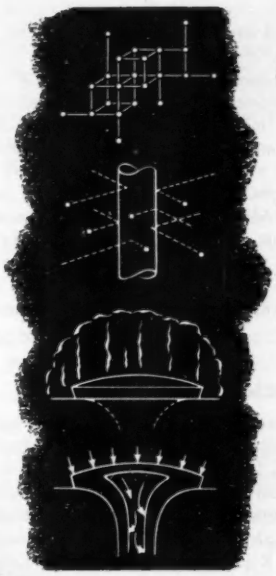


Source: U. S. Dept. of Commerce

4 Thompson firsts that make T.P.M. valves best

Thousands of Thompson T.P.M. Valves are piling up amazing service records in military and commercial aircraft engines. Hundreds of hours of severe service leave T.P.M. Valves looking literally as good as new. Time between valve overhauls is lengthened. Maintenance costs are reduced, lost flight-time due to valve failures has been practically eliminated.

Here's why . . .



ALLOY

T.P.M. is the new valve material developed by Thompson to give greater corrosion resistance and higher strength.

SHOT PEENING

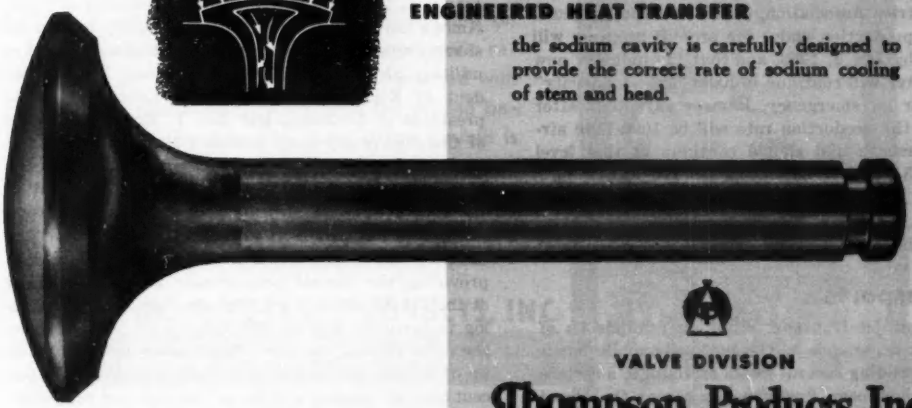
mechanically hardens T.P.M. stems to provide longer service with less wear.

CONTROLLED ATMOSPHERE

application of a Thompson-developed hard-facing material by arc-weld, assures a tough, homogeneous layer to resist high head temperatures.

ENGINEERED HEAT TRANSFER

the sodium cavity is carefully designed to provide the correct rate of sodium cooling of stem and head.



VALVE DIVISION

Thompson Products, Inc.

CLEVELAND 17, OHIO

AIR BRIEFS

By ROBERT McLARREN

Back to Business

As predicted here last month, the Aircraft Production Board has summarily rejected the "Campbell Plan" for the summary reorganization of the production program to incorporate new models on the assembly lines. The plan was formulated by W. L. Campbell, acting chairman, and submitted to the full Board for study. In addition to solid military rejection of the idea, the Board had quietly asked Dr. T. P. Wright, World War II aircraft production head and now vice president of Cornell University, to prepare a private study of the overall aircraft production program. Dr. Wright's brief study utterly rejected the idea of a sudden shift in aircraft types. Thus, the current A-18 aircraft production and AE-18 aircraft engine production schedules remain undisturbed.

Looking for the Forest

We cannot help but be confused by what is clearly an argument between the Administration and the aircraft manufacturing industry over "how we are doing." We are told repeatedly that the military aircraft expansion program is not doing nearly as well as expected, that the industry is saturated with orders and that any additional orders at this time wouldn't produce any more airplanes until 1954 at the earliest. Now comes Adm. D. C. Ramsey, president of the Aircraft Industries Association, to say that the "plateau" of aircraft production under the present program will be reached by Jan. 1, 1953, and that the industry now and thereafter will continue to have "excess capacity" available for an emergency. Ramsey says that after next Jan. 1 the production rate will be 1000-1100 airplanes per month and should continue at that level until the 143-wing, 16 carrier group program is met. Meanwhile, Ramsey says, airframe weight will continue to rise, reflecting a growing proportion of heavier aircraft in the program.

Jet Transports

The current jet transport situation reminds us of the frequent experience of the new automobile buyer who, after spending several weeks of visits to a certain car dealer showroom, finally walks across the street and buys a rival make. In the past few weeks all of the major U. S. airline executives have visited the shrine of the jet transport—the de Havilland factory in England. First to be "sold" was "Captain Eddie" Rickenbacker, who announced a firm desire to buy the Comet, but was unable to receive delivery dates earlier than 1956. Both O. M. Mosier and William J. Hogan, American Airlines vice-presidents, recently visited the Comet plant, and Harold R. Harris, Pan American vice-president, has given the big silver jet transport a close inspection. Meanwhile, Boeing, Douglas and Lockheed are rushing "presentations" to completion for U. S. airlines on their latest (of a long series) jet transport designs. These may well be the rival showroom models across the street which ultimately get the business generated by long looks at the sleek British jet transport. But the British, too, are offering new models. Handley Page is offering a really big jet transport (answering general U. S. criticism that the Comet capacity of 40 passengers is too small) with a maximum capacity of 150 passengers and capable of crossing the Atlantic in 6½ hours. Avro, whose beautiful delta-wing Model 698 bomber stole the Farnoborough show, is preparing a 107-passenger version for airline use, and Vickers is studying proposals for a passenger version of its swept-wing, high-speed Valiant jet bomber.

Financial Opinion

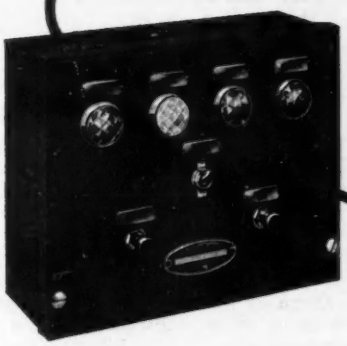
Is a two per cent return on sales enough? The aircraft industry says "No" but Air Force Undersecretary R. L. Gilpatric seems to think the answer is "Yes." Among industry leaders who have recently spoken out sharply against the low profit margin being allowed on military aircraft production are Mundy Peale, president of Republic Aviation Corp., Robert E. Gross, president of Lockheed, and Roy T. Hurley, president of Curtiss-Wright Corp. Industry average profit after taxes during last year was 2.02 per cent, and it has been claimed that a reduction of only 14 per cent in the present level of aircraft procurement would wipe out this profit. Gilpatric, in contrast, believes that the industry can remain sound with this low profit margin providing the annual procurement program remains at the $10-12 billion level. The aircraft industry backlog is currently $14,507,000,000—up 53 per cent over the same time a year ago. This huge backlog is made up of 63 per cent complete aircraft and parts, 29 per cent aircraft engines and parts, two per cent propellers and parts and the remaining six per cent in other aviation products and services. Lockheed president Gross believes that lowering the cost of planes should

(*Turn to page* 108, *please*)

Audible Alarm PLUS A *Visual Signal*

WITH **SYNCHRO-START**

SAFETY ALARM SETS

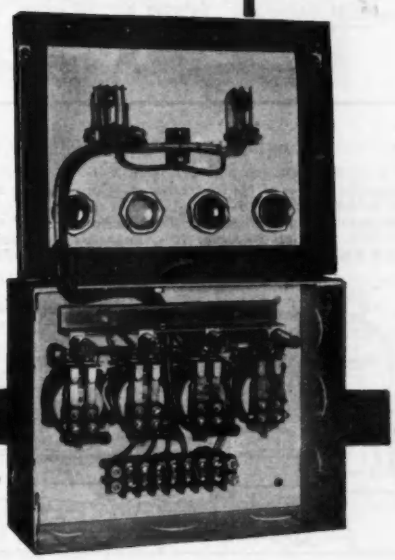


A dependable safety alarm set at a price well within the budget of every engine owner. One failure will more than repay the cost of the control in the saving of repair bills and loss of service.

Provides a visual signal combined with an audible alarm for any number of safety signals desired; a light to show when the control is operative; a test switch to check all failure circuits simultaneously, and an alarm silencing button with automatic reset. These sets also can be furnished with a shutdown circuit to stop the engine before damage can occur if the trouble is not corrected soon enough.

Write for the new Synchro-Start catalog fully describing these Alarm Sets and our complete line of automatic engine controls.

IN CASE OF—
LOW OIL PRESSURE
LOW AIR PRESSURE
OVERHEATING, ETC.



SYNCHRO-START PRODUCTS, INC.

Automatic Engine Control Equipment

8151 N. RIDGEWAY AVE.,

SKOKIE, ILLINOIS

Free Piston Engine and Gas Turbine

Power French Experimental Locomotive

By W. F. Bradley
Special European Correspondent
for AUTOMOTIVE INDUSTRIES

PARIS, FRANCE

THE first railroad locomotive having a free-piston generator and a gas turbine has been produced by Renault and is now in experimental service on a line in the north of France. The free-piston generator is a development of the work undertaken by De Pescara, and its first application to a locomotive has been worked out by engineer F. Picard, of the Renault Co., and Robert Huber. Having an overall efficiency of 33 per cent, it is comparable with the Diesel, but has the advantage that it does not require an electric, or hydraulic transmission.

The generator consists of a horizontal, two-stroke, opposed-piston injection-type engine, as shown in illustration, the combustion chamber bore in this case being 13.4 in., the compression chamber bore 35.46 in., the stroke under full load 17.73 in., and the number of cycles 600 per min. The gas pressure under full load is 92 psi. The maximum gas temperature is said to be 3270F. The temperature of the gases reaching the turbine is between 1290F and 1380F.

The generator A (Fig. 1) has a couple of two-

(*Turn to page 90, please*)

Fig. 1—Schematic sectional view of the power plant. A—Free-piston generator; B—Buffer tank; C—Gas turbine; 1—Piston; 2—Power cylinder; 3—Bounce cylinder; 4—Compressor cylinder; 5—Intake valve; 6—Transfer valve; 7—Injector; 10—Engine diagram; 11—Bounce cylinder diagram; 12—Compressor diagram.

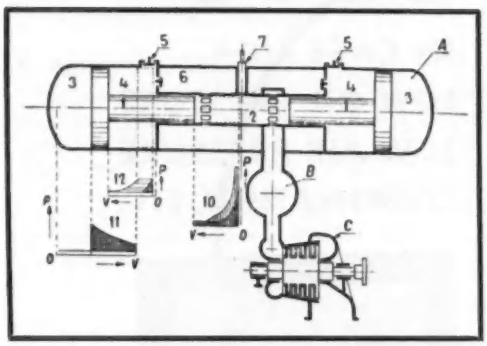
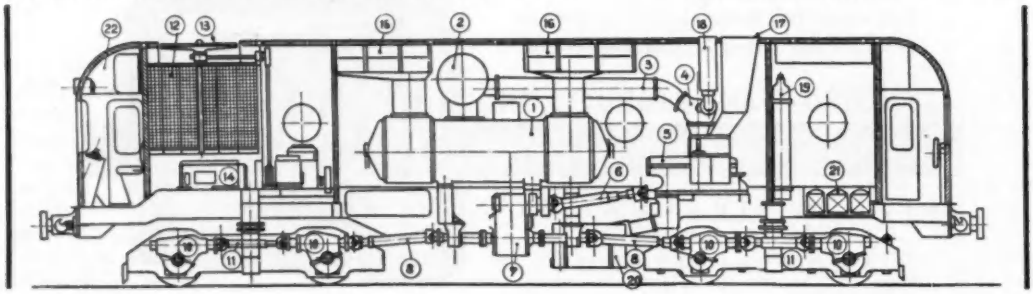
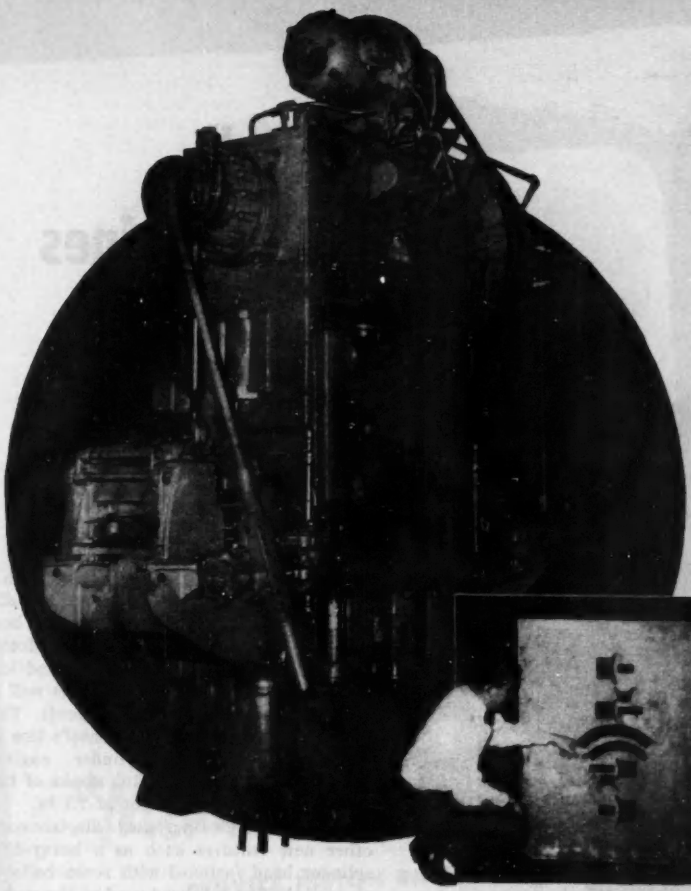
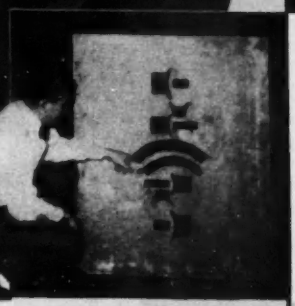


Fig. 2—Schematic drawing of the locomotive. 1—Gas generator; 2—Buffer tank; 3—Gas feed pipe; 4—By-pass; 5—Gas turbine; 6—Transmission shaft turbine to reduction gear; 7—Reduction gear and two speeds; 8—Drive to axles; 9—Bogie; 10—Axle housing; 11—Drive shaft between two axles; 12—Radiators for oil and water; 13—Fan; 14—Auxiliary Diesel engine; 15—Auxiliaries: compressors, water and oil pumps, electric generator, electric motor; 16—Air filter under roof; 17—Turbine exhaust; 18—By-pass exhaust; 19—Compressed air bottles for starting generator; 20—Turbine oil tank; 21—Storage batteries; 22—Driving cab.







Template shows sizes and shapes of laminations produced in this operation

LOGICAL CHOICE

This Clearing press in the new multi-million dollar "dream plant" of Lincoln Electric Company at Cleveland is producing laminations at 150 strokes per minute, with automatic feed and scrap cutting. Perhaps no manufacturer is better known than Lincoln Electric for its unremitting attention to costs, coupled with a famed incentive system that gives its workers an average yearly wage exceeding $7,000.

Only the most efficient equipment can win a place in such a plant. It's no coincidence that Clearing presses are commonly found in plants that are setting new standards for industry. Clearing presses have been setting new standards on their own—new conceptions of speed, of accuracy, of die life. It will pay you to check with Clearing engineers for a forward-looking answer to your press problems.

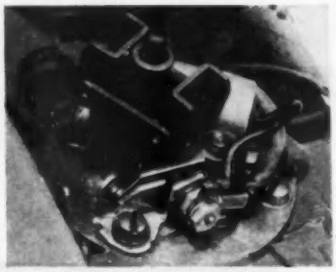
CLEARING MACHINE CORPORATION

6499 WEST 65TH STREET ★ CHICAGO 38, ILLINOIS

HAMILTON DIVISION, HAMILTON, OHIO

CLEARING PRESSES

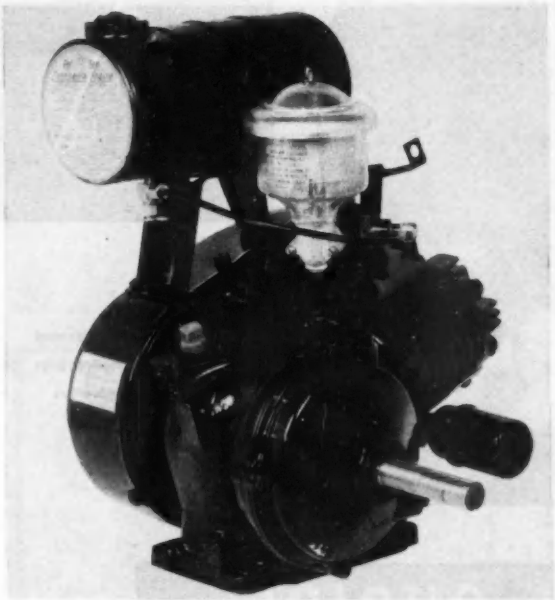
THE WAY TO EFFICIENT MASS PRODUCTION



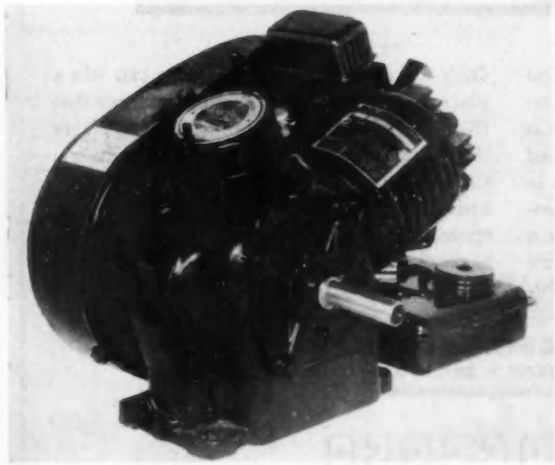
Contex system distributor with cover removed.

Small Continental Engines

Feature More Power and Improved Ignition



New AU-8 model with six-to-one reduction gear.



Contex system distributor with cover removed.

A NEW 2½-hp gasoline engine with a bore of 2¼ in., stroke of two in., and displacement of eight cu in. has recently been put into production by Continental Motors Corp. It has been designed for good lugging characteristics at low speed as well as excellent performance at high speeds. This new unit supplements Continental's line of four-stroke, aircooled cylinder engines which have a bore of 2⅛ in., stroke of two in., and piston displacement of 7.1 in.

In addition to increased displacement, other new features such as a heavy-duty cylinder head fastened with seven bolts in place of the five-bolt head used on the standard models, and improved cooling are included in the latest engine.

Continental's External Ignition Breaker Point System, which has been introduced with the Corporation's new models and is now in full-scale production, facilitates quick, easy servicing of the breaker points and condenser. These parts are readily accessible after removing a cap held by two spring clips similar to those which hold the distributor cap on automobile ignition systems. Breaker points operate at one-half engine speed which means approximately double the service life obtained from points which operate at crankshaft speed.

Spring-loaded baffles are used for cylinder head and cylinder sides. They are removed by releasing the spring, thus making cleaning extremely simple. A new back plate with an enlarged air metering slot provides 50 per cent increase in air flow and a large increase in cooling capacity.

A forged, induction hardened crankshaft with large diameters throughout assures added stiffness and strength, and a forged aluminum alloy connecting rod provides strength with minimum weight.

"Made for Each Other!"

SERVICE PISTON RING SETS BY MUSKEGON ARE DESIGNED FOR A SPECIFIC ENGINE ONLY!

This set of service piston rings was designed and produced in the same way as the original rings—for a single, specific engine!

These rings are not simply an "all-purpose" set suitable for just any engine. They and their respective engine were truly "made for each other" by close collaboration of the car manufacturer and Muskegon Piston Ring Company. In this way, and in this way only, can service piston rings enable an engine to deliver its full measure of economy and power.

These *Factory Approved* and *Factory Engineered* Service Piston Ring Sets are available only through car dealers and other authorized service outlets.

This set of service rings was designed especially for a specific engine by the engine maker* and Muskegon.

Piston Rings

MUSKEGON PISTON RING CO.
MUSKEGON, MICHIGAN
PLANTS AT MUSKEGON AND SPARTA

"THE ENGINE BUILDERS' SOURCE"

**Name on request*

Copyright 1952 by Muskegon Piston Ring Company

Precision Jet Engine Blades

(*Continued from page 46*)

design as the blade miller. This machine grinds the entire airfoil including leading and trailing edges. In this case, however, the grinding wheel operating at a speed of 6200-6500 sfpm grinds closely spaced elements around the complete airfoil of the blade while the blade is rotated with cam-actuated motion.

7. The only other major operation required with this method is to polish the blade all over. At Fostoria where larger blading with parallel sides is produced, polishing is done in a large six-station Hammond automatic cycle blade polishing machine. At Lima, blades with more pronounced twist are polished on Ex-Cell-O Style 88 Precision Profile Polishers.

All of the steps outlined above are handled in automatic machines, requiring only loading and unloading, and pushing "start" buttons. Consequently, most of the equipment, except for foot grinders, is tended by female operators. Moreover, loading and unloading has been so simplified that these operators can usually take care of a number of machines without difficulty.

Special attention to machine design and cycle automaticity as well as the elimination of operator function—except for loading and unloading—has resulted in exceptional levels of quality control, rejects for any cause being a rarity. Consequently, the cost of inspection has been sharply reduced and spoilage practically eliminated.

Let us consider briefly some of the major characteristics of the machines used in this process. The Ex-Cell-O Style 85 Precision Two-Wheel Form Grinder has two 24-in. diameter formed face grinding wheels mounted horizontally, driven by two 25 hp motors, mounted on the base of the machine independent of the wheel slide. Removable type work fixtures are used which are loaded and unloaded by hand away from the machine.

Using a two-wheel arrangement, the setup makes it possible to finish both sides of the root simultaneously. The machine is fitted with two cam-type diamond wheel dressers of essentially the same type as proved by years of use on Ex-Cell-O thread grinders.

Blades or buckets that have special forms on the bottom face of the root are finish-ground from the rough in the vertical Ex-Cell-O Style 84 Precision Surface Form Grinder. It grinds any form specified for the operation.

Basic features of the Ex-Cell-O profile milling machine, Style 86, for milling the blade may be visualized from the sketch reproduced here. As shown, the root of the blade is fitted in the work-holding chuck at the left while the tip is held on a center. A series of steady rests is clamped into position by hydraulic pressure and holds the blade steady while the milling cutter is in action. Action of the blade spindle during the milling cycle is controlled by a master cam and a follower. The master cam, made from the engineer's enlarged glass layouts, is a large scale replica of the geometrical form of the blade. The follower then produces the appropriate rise-and-fall of the spindle head while the milling cutter progresses along an element.

At the extreme end of the same spindle is an index wheel as shown, contacted by a microswitch which con-

HARDENED & GROUND PARTS
to exact specification
This spring pivot bolt typifies our machining versatility and strict adherence to specifications. Bolt is made from 1⅞" high-carbon alloy steel hex bar stock; overall length, 5⅞". Threads are precision cut, concentric with body diameter. After heat treating, threads are re-threaded to the specified pitch diameter. Bearing surface is ground to a fine micro-finish, ± .001 tolerance. The very la... ...ipment is used to make the knu... ... clean and sharp.
Brown Hardened and Ground Parts have served the automotive industry for over 40 years. Our specialty is precision machining, scientifically-controlled heat treating and micro-finish grinding. How can we serve you? Write or wire . . .
Henry W. Brown
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Experienced production on:
King Pins
Shackle Bolts
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Stub Axle Shafts
Steering Ball Bolts
Beam Balls and Bolts
Sth Wheel Rocker Shafts
Wheel Studs
Water Pump Shafts
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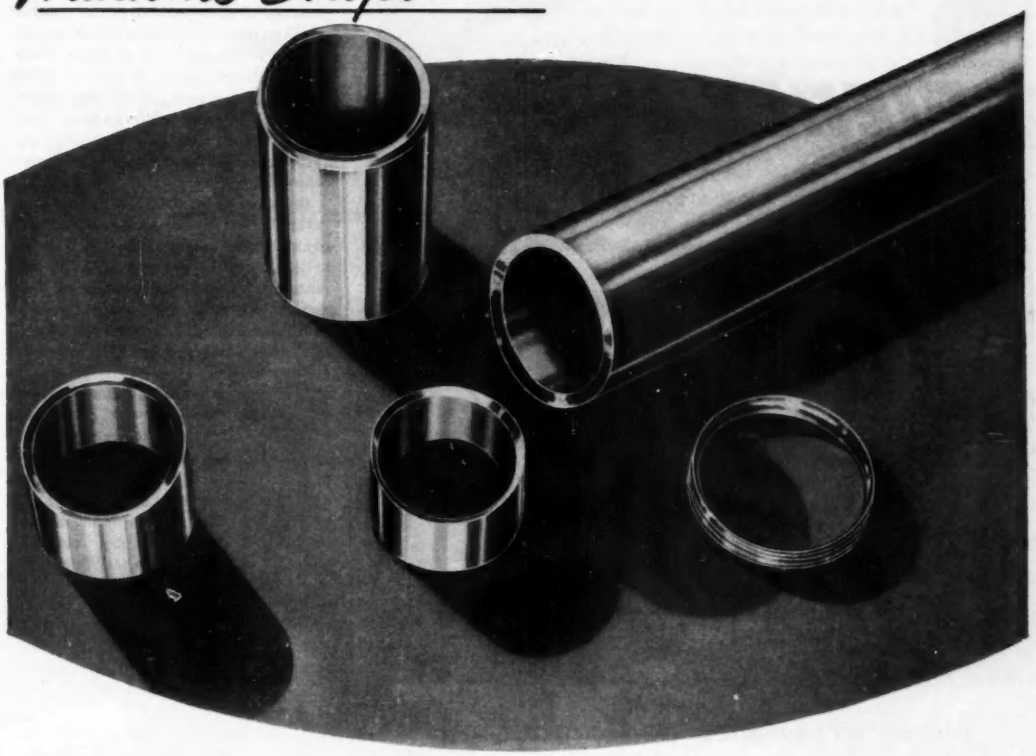

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trols the action of the work spindle motor. Each pin on this wheel represents an element of the blade. The number of pins—and thus the number of elements—being determined experimentally for each type of blade. Thus the work spindle is caused to move horizontally across the milling cutter, to oscillate under cam action, and feed from element to element; in the latter case by the action of the index wheel.

It may be noted that when the "start" button is pressed, the hydraulic mechanism clamps the work spindle securely and clamps the steady rests in place before cutting is initiated. Pressure on the steady rests is automatically relieved just before the blade is turned to mill the next element.

The precision profile grinder, Style 87, operates on a somewhat analogous principle. However, it does not employ steady rests since the cut is peripheral and similarly the feed is by horizontal increments along the length of the blade, the blade spindle in this instance being constantly rotated. Actually, then, the wheel contacts every point on the airfoil, grinding the tip radius on both edges in the process. To this end the work spindle is controlled by cam action designed to vary spindle speed in accordance with location of the wheel on the blade profile.

In addition, the profile grinder has a face cam at the end of the spindle to provide the extra control for meticulously forming the basic blending of the blade and root all around.

The final step, as made at Lima, is polishing in an Ex-Cell-O Style 88 precision profile polisher.

One of the most impressive features of the machines mentioned here is that although they are of special purpose type, they are really flexible universal machines when it comes to blade production. The fact is that profile millers, grinders, and polishers can be tooled for any type of blade simply by changing cams and work-holding fixtures; while foot grinders require mainly a change in wheels and dresser cams.

Both in producing the blades and in their inspection, the controlling element is the thickness. If this is within specified limits the blade is considered perfect since the cams are responsible for the formation and this action is invariable. In this connection, it may be noted that the grinding wheels used for profiling are dressed by a hand operated dresser after each blade is completed.

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units are installed at each battery of six to eight profile grinders, depending upon the layout of a given department, to precipitate oil fumes and keep the atmosphere clear and clean. In winter this has the additional advantage of permitting recirculation of air without exhausting to the outside, thus reducing the need for reheating the air in the area. It is claimed that a 5000 cfm Precipitron unit will recover as much as 15 to 20 gallons of oil mist in an eight-hour shift and return it to the oil sump for reuse.

The Lima plant has been built on a property comprising some 80 acres. It is of latest type construction with an impressive installation of fluorescent light sources designed to produce an illumination of 40 ft-candles at work level. Another interesting feature is the extensive installation of Bull-Dog Bustribution power duct lines. They have 6000 ft of 440-volt duct for machinery; and another 6000 ft of 110-volt duct for serving the lighting installation.

This plant too boasts an installation of General Electric continuous furnaces for hardening and drawing blade forgings, to be placed in operation when production volume justifies. The two furnaces are arranged side-by-side with a common loading and unloading station and interconnected with an automatically operated conveyor system.

Finally it may be noted that Ex-Cell-O not only produces the special equipment described above for its own use as well as for sale to other blade manufacturers, but is also responsible for the end use of the blades it makes. The Robbins Engineering Div., in Detroit, is set up for the production of complete axial flow rotors, using blading made in Ohio plants, as described.

ASM Grants Three Teaching Awards

The American Society for Metals has announced winners in its competition for the three best teaching performances in the metallurgical field during 1951-52. Awards of $2000 each go to Arthur A. Burr, associate professor, Dept. of Metallurgy, Rensselaer Polytechnic Institute; Joseph W. Spretnak, associate professor, Dept. of Metallurgical Engineering, Ohio State University, and Robt. D. Stout, professor, Dept. of Metallurgy, Lehigh University. The award were established by ASM to stimulate interest in better teaching performance and to increase student enrollment in metallurgical engineering.

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AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

Britain's New Military and Civilian Planes

(*Continued from page 37*)

It is claimed that the very secret Avro bomber flies faster, farther and higher with a bigger load more economically than anything else in the world. The delta wing is the natural evolution of design. Its simplicity of construction, stiffness, excellent aerodynamic characteristics and its versatility are said to provide more of the essential qualities for either a bomber or a transport than any other type of airplane.

The Gloster GA-5, now christened the Javelin, and produced by the Hawker-Siddeley group, was a complete secret last year but now has been given super-priority as an all-weather day and night fighter for the R.A.F. This two-passenger, long-range radar equipped fighter is the world's first twin jet-engined delta. It flew for the first time in November 1951, and is equipped with two Armstrong Siddeley Sapphire turbojets, each type tested at 8,300 lb. With its two engines the plane therefore has a total thrust of more than 16,000 lb.

Another machine which has been developed quickly is the De Havilland 110, which a year ago had not flown and has since, and on several occasions, passed the speed of sound, its first supersonic flight having been made last April. The D. H. 110 all-weather multi-purpose fighter is of twin-boom construction with sharply-swept wings with twin Rolls Royce Avon engines, with air intakes at the wing roots. No performance figures have been released. The machine has a length of 52 ft and a span of 51 ft.

A delta-wing aircraft for aerodynamic research the P120, was to have been presented by Boulton Paul Aircraft Ltd., but it met with a flying accident just before the opening of the meeting.

Another supersonic interceptor was the Hunter built by the Hawker Aircraft Co., and which has been given super-priority for the RAF. This is a development of the previous Hawker jet fighters and has been ordered "off the drawing board." The power plant is a Rolls Royce Avon with air entry at the wing roots, and which probably will be equipped with an afterburner. This machine is claimed to be faster than the Sabre or the MiG-15. It has a span of 33 ft, eight in., and a length of 45 ft. three in.

The Vickers Supermarine Swift, also placed on the super-priority list, made an impressive demonstration. Its speed possibilities can be judged from the average of 665.9 mph in a flight from London to Brussels this year. It has swept-back wings, with "elephant ear" air intakes flanking the fuselage just forward of the wing leading edge. Power is obtained from a Rolls Royce Avon, with provision for an afterburner. Span is 32 ft, four in., length 41 ft, six in., height 12 ft, six in., and wing area 295 sq ft.

Latest of the British high-speed bombers is the Vickers-Armstrong Valiant, just placed on the super-priority list for the RAF, and the first four-jet bomber to be built in England. The engines are Rolls Royce Avons, buried in pairs in the wings and fed from a common air inlet on the lead-

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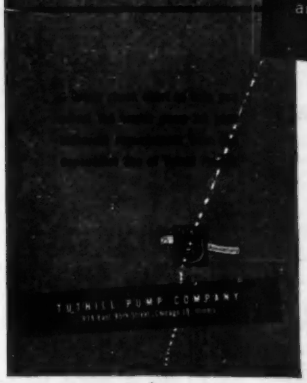

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AMBLER CHEMICALS ACP PROCESSES PENNA.

Technical Service Data Sheet

Subject: IMPROVING PAINT ADHESION ON STEEL WITH GRANODINE®

INTRODUCTION

"Granodine" is a zinc phosphate coating chemical which improves paint adhesion on steel, iron and zinc surfaces. In the Granodizing process, a non-metallic crystalline coating is formed on the treated metal. This bond holds and protects the paint finish and thus preserves the metal underneath.

Official Dept. of Defense Photograph

An F4U Corsair with the Navy's new aircraft anti-tank rocket, the "RAM". A Grade 1 zinc phosphate finish (JAN-C-490) protects the entire external surface of this rocket and provides a durable bond for the specification paint finish.

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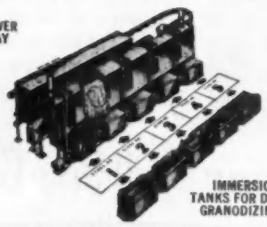
JAN-C-490, Grade I	CLEANING AND PREPARATION OF FERROUS METAL SURFACES FOR ORGANIC PROTECTIVE COATINGS
JAN-F-495	FINISHES FOR EQUIPMENT HARDWARE
U.S.A. 57-0-2C Type II, Class C	FINISHES, PROTECTIVE, FOR IRON AND STEEL PARTS
U.S.A. 51-70-1, Finish 22.02, Class C	PAINTING AND FINISHING OF FIRE CONTROL INSTRUMENTS; GENERAL SPECIFICATION FOR
MIL-V-3329	VEHICLES, COMBAT, SELF-PROPELLED AND TOWED; GENERAL REQUIREMENTS FOR

GRANODIZING DATA

Granodizing is an easily applied chemical process. Depending on the size, nature and volume of production, Granodizing can be carried out by spraying the parts in successive stages of a power washing machine, by dipping the work in the cleaning, rinsing and coating baths contained in tanks, or by brushing or flow coating the work with portable hand equipment. Typical process sequence and equipment requirements are shown below:

MULTI-STAGE POWER WASHER FOR SPRAY GRANODIZING



PROCESS SEQUENCE
1. Clean
2. Rinse
3. "Granodine"
4. Rinse
5. Final Rinse

IMMERSION TANKS FOR DIP GRANODIZING

NOTE: Equipment can be of mild steel throughout, except in the Granodizing stage, where nozzles, risers, and pump impeller should be of acid-resistant material.

MANY APPLICATIONS

Automobile bodies and sheet metal parts, refrigerators, washing machines, cabinets, etc.; projectiles, rockets, bombs, tanks, trucks, jeeps, containers for small arms, cartridge tanks, 5-gallon gasoline containers, vehicular sheet metal, steel drums and, in general, products constructed of cold-rolled steel in large and continuous production are typical of the many products whose paint finish is protected by "Granodine".

CHEMICALS ACP PROCESSES

WRITE FOR FURTHER INFORMATION ON "GRANODINE" AND YOUR OWN METAL PROTECTION PROBLEMS.

CHEMICALS ACP PROCESSES

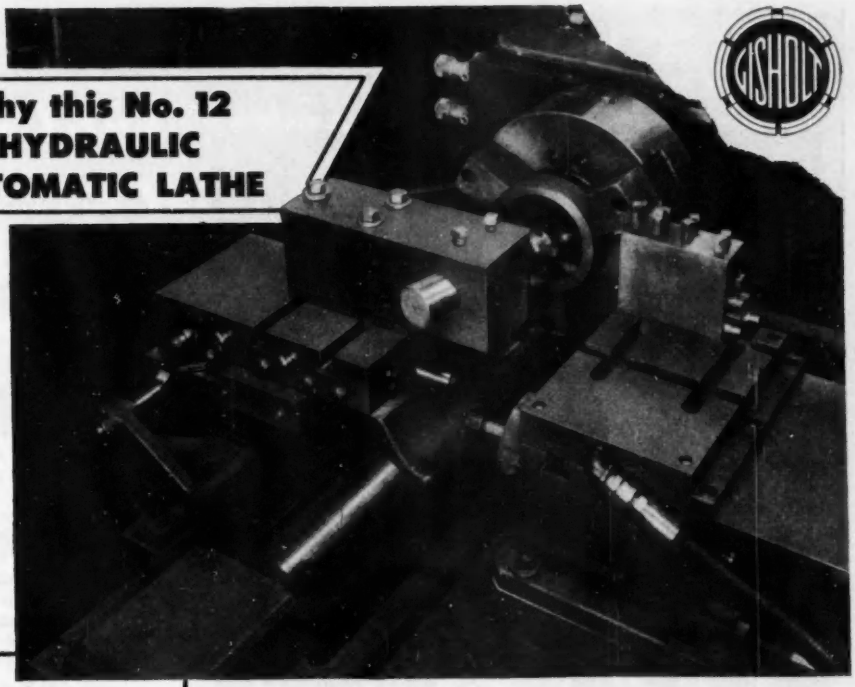
ing edge. The first plane made its appearance at Farnborough a year ago, but was later destroyed in an accident. The new one has not been changed in basic design and features a large-area wing of deep root chord. The bomb bay will take an atomic weapon and extends a greater distance than the wing root chord. All performance figures are secret.

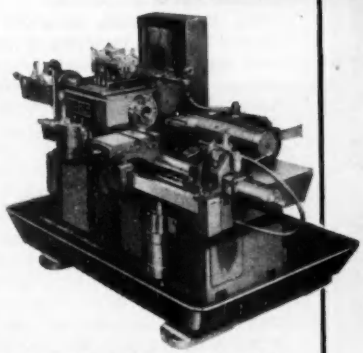
The Short S.A./4, built by Short Brothers and Harland Ltd., at Belfast, is classed as an experimental plane, but apparently has been outclassed by the less orthodox Valiant. The S.A./4 first flew in August of last year, having been built at the request of the Air Ministry. Somewhat conventional in design, it features the mounting of the four Rolls Royce Avons in pairs, one above the other, in wing nacelles. It has a span of 109 ft, for a length of 102 ft, 2 in. It is stated that it is not obsolescent, even if its performance is lower than that of the Valiant and that it will carry the large loads demanded by operational requirements.

In addition to the Canberra which made the Atlantic round trip in one day, several experimental versions of this bomber were shown. These comprised a Rolls Royce Avon with afterburner, which it is said double the rate of climb, although no performance figures were given; a Bristol Olympus Canberra, doubtless the most powerful twin-engined airplane flying anywhere in the world, for it is understood that the thrust of each engine has been boosted to 10,000 lb; the Armstrong-Siddeley Sapphire Canberra, with each engine giving 8300 lb thrust. The Sapphire will power the Martin B.57 Canberra and the Republic F.84F Thunderjet fighter.

Outstanding in the helicopter field was the Bristol 173 twin engine job, which made its first flight in January of this year. This aircraft is powered by two Alvis Leonides radial engines of 525/545 hp. It is designed primarily as a short to medium range commercial transport craft for 10 to 13 passengers and also has a variety of possible military uses. It can readily be converted to a freighter carrying 2500 lb of cargo. Normal total weight is 10,600 lb. Rotor diameter is 48 ft, 6.7 in.; overall length with blades folded 78 ft, two in.; maximum cruising speed 113 mph at 2500 ft; performance over typical range, 100 miles at 85 mph at 2500 ft, with payload of 1200 lb. The 171 Bristol Sycamore, Type 171, which is in service with the Army Helicopter Unit and with RAF Coastal Command,

why this No. 12 HYDRAULIC AUTOMATIC LATHE





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also was demonstrated at the show.

Twenty-six different types of engines were presented. These comprised two liquid-cooled piston engines; nine air-cooled piston engines; six turboprops; and nine turbojets. Rolls Royce is the only firm building liquid-cooled piston engines. These are the 12-cyl Griffon 57 and the Merlin 35. The air-cooled engines included a variety of types from the four-cyl, in-line of as low as 145 hp, to the Bristol Centaurus 18-cyl sleeve valve radial, giving a maximum of 2600 hp at sea level.

Last year D. Napier & Son, Ltd., presented the Nomad, a combination of piston and gas turbine. Development work is still being carried out and when the production model is ready next year it is claimed that it will be lighter and more powerful than the one at present being built. The present engine embodies a 12-cyl horizontally opposed compression-ignition engine supercharged by an axial and a centrifugal compressor in series. The engine drives the rear hub of a contra-rotating propeller while the exhaust gases from the engine are fed into a gas turbine that powers the front hub of the propeller.

The Napier Eland, presented for the first time, is a turboprop of single shaft type driving a single rotation, constant-speed propeller. The engine layout comprises an axial compressor, six detachable combustion chambers, and an axial flow turbine. A notable feature of this engine is the specific weight of only 0.525 lb/equivalent hp. Net dry weight is 1575 lb, takeoff horsepower is 3000 and fuel consumption 0.624 lb hp/hr. Flying at an altitude of 30,000 ft, at 350 mph, the fuel consumption is 0.49 lb hp/hr. The Eland has been designed for a nacelle of the minimum dimensions and drag which can be accommodated behind a 3000 hp propeller and spinner, the overall length being 104½ in., and maximum diameter 36 1/16 in. Permission to release particulars of this engine came only a few days before the show opened. Development work will continue for another year, and probably both the Eland and the Nomad will get into full production about the same time.

Armstrong-Siddeley, with two engines classed as super-priority—the Sapphire for the Gloster Javelin and the Double Mamba for the Fairey Gannet—is now producing "short life" engines for realistic target practice. One of these, the Viper, is fitted in the Australian Jindivik pilotless target aircraft and is a compact unit of simple construction designed for

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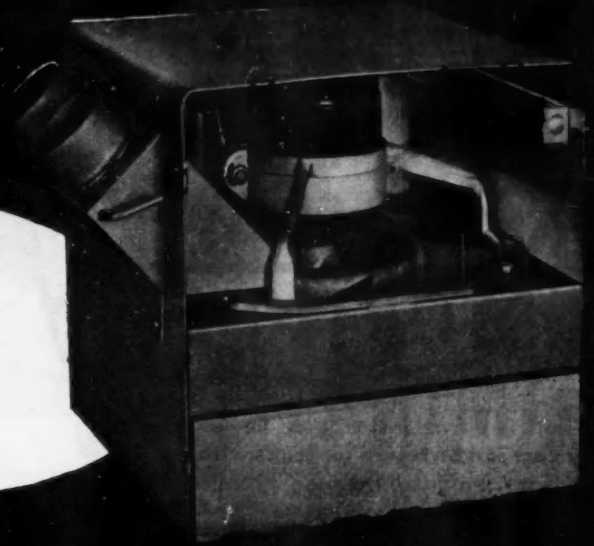

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cheapness in mass production. The Viper has a sea level static thrust at 13,400 rpm of 1575 lb, a net dry weight of 365 lb, and overall dimensions of 65.4 in. length and 23.25 in. diameter. The Adder is a turbojet adoption of the Mamba, giving 1050 lb thrust. In addition to being used on the Australian radio-controlled pilotless aircraft, it also powers the Swedish Dragon Saab 210 delta-winged machine.

Flight trials have been concluded with the Armstrong-Siddeley 2000 lb thrust Snarler on the Hawker P.1072. This is a methanol/water mixture and liquid oxygen booster, usually installed in the tail, and can be switched on or off, as required for operations.

Rolls Royce presented a cartridge-type booster on the Avon turbines fitted in the Canberra test bench, but withheld all particulars. Bristol reported work on a ramjet vehicle originally designed in the Royal Aircraft Establishment, but the model shown was not the latest version.

French Experimental Locomotive

(*Continued from page 74*)

stage symmetrical pistons (1). The power cylinder (2) operates on the two-stroke, compression-ignition principle. The two end compartments (3) are bounce chambers assuring the return of the pistons after the power stroke. The space (4) is the compressed air cylinder, supplying air for scavenging and feeding the power cylinder. Fresh air is drawn in through the valves (5) and on being compressed is delivered through the valve (6) to the chamber surrounding the power cylinder. Fuel is injected by six injectors (7) placed around the combustion chamber and fed by two injection pumps. The combustion gases, mixed with the excess scavenging air, escape into the buffer tank (B), and from there to the six-stage Rateau turbine of 1000 hp.

Power transmission is entirely mechanical and is controlled by variation of the flow of gas to the turbine. The first stage is through a two-speed reduction gear, with a ratio of 6.25 to 1, and from there by means of universally jointed shafts to the two bogies (Fig. 2)

The Renault 1000 hp. locomotive is equipped with a six cylinder Diesel used as an auxiliary. This engine, which has a bore of 4.13 in. a stroke of 4.33 in., and a piston displacement of 338.2 cu in., drives a fan, an air compressor, an electric generator, and pumps for oil and water. Air from the compressor is used for brakes and control gear as well as for starting the generator. Total weight is about 54 tons. Overall length is 53 ft, and width eight ft, 11 in. The locomotive operates on standard gage track. Its top speed is about 77 mph.

Before going into rail service the power plant had operated 4,000 hours under test, using gas oil, and light or heavy fuel oil. The heavy fuel oil was filtered and raised to a temperature of 185F before reaching the generator and the light fuel oil was brought to a temperature of 140F. The efficiency being equal to that of the Diesel, and the cost of production being lower by reason of the simplicity of the generator and the absence of any electric or hydraulic transmission, the Renault engineers consider that there is an important future for this type of locomotive.

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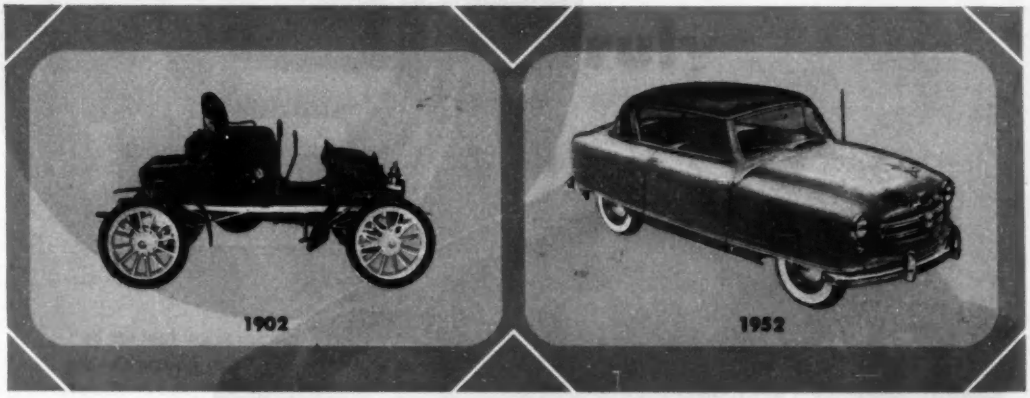

on 50 years of Golden Progress

The 1902 Rambler shown above was one of the world's first mass-produced cars. Today, the 1952 Nash Rambler, also illustrated above, is maintaining the tradition of a great name in automotive history. The three Nash Golden Airflytes—the Ambassador, Statesman and Rambler—are writing new success stories in sales, style, advanced engineering and performance.

In the fifty-year period between these models, Nash has produced more than 2,250,000 automobiles . . . pioneered scores of important developments. You can be certain that Nash will continue to build automobiles that set a pace and pattern for the cars of tomorrow.

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The diagram below shows you how quickly and easily STANDARD X-WASHERS clinch to a positive 360° closure. What's more, they can be removed just as easily when servicing is necessary. Reduce production time and costly failures with the safe and sure STANDARD X-WASHER.

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STANDARD Locknut and Lockwasher, Inc.
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Watkins Glen Sports Car Meet

(*Continued from page* 49)

they were at Le Mans, and featured numerous changes. Brake improvements were high on the list. The illustration of the new Cunningham front profile shows their bladed drums. Body shapes also were changed radically, with, it is said, the aid of wind tunnel and pure design calculations which justified the shapes chosen. One of the three Cunninghams, that driven by Walters, was a coupe type. Oil coolers on all three cars were placed on the right hand cowls, projecting into the airstream.

Briggs Cunningham himself gave weight to the potency of his new *rapides* by adequately leading the only full lap of the Grand Prix which was completed and his confreres were occupying positions of comforting support for the marque when the contest was stopped. In view of the circumstances these facts are quite obviously of no lasting import, but, such as the record of the 1952 Grand Prix is, the Cunninghams are placed upon it.

Ignition analysis was added to the list of inspection procedures at the Glen this year. The testing was handled by a Bendix Ignition Analyzer.

Nash was presented the Walter Von Schoenfeld Cup which is awarded to the manufacturer which has done the most for the interests of sports cars in this country and abroad. It was accepted by L. C. Stewart, sales promotion manager of Nash-Kelvinator, and recognized the development of the Nash-Healy sports car, which placed third in the Le Mans 24-hour race this year.

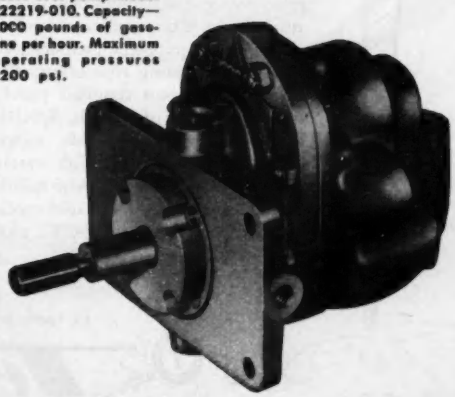
BOOKS . . .

TECHNICAL REPORTING, *by Joseph N. Ulman, Jr., published by Henry Holt and Co., Inc., 383 Madison Ave., New York, N. Y. Price, $4.75.* The basic aim of this practical handbook is to instruct the reader in the mastery of clear and concise written and oral expression within the framework of his own specialized field. Every phase of technical reporting is discussed and profusely illustrated with photographs, diagrams, charts, etc. Among the many facets of the art covered are: important fundamental principles; general procedures; general, informal, formal, laboratory, and oral reports; writing from the point of view of style, grammar, and punctuation; mechanics of composition; and tables.

RCAF VAMPIRES are fed by dependable Pesco fuel pumps

The powerful DeHaviland Goblin jet engine that powers this sleek sky raider demands plenty of fuel at all times. Pesco fuel pumps have been selected as the replacement pump for all Vampires now in operation by the Royal Canadian Air Force.

This Pesco pump costs less originally, yet gives greater reliability, longer service life, and reduced maintenance costs. That's why more and more plane manufacturers and operators are using Pesco products for controlled flow of fuel. Pesco's skilled craftsmen have provided the precision-made fuel and hydraulic pumps and controls that are standard equipment on all types and makes of planes. It is experience and know-how that can help you.



Pesco fuel pump model 022219-010. Capacity—7000 pounds of gasoline per hour. Maximum operating pressures 1200 psi.

engineering Pesco production

PRODUCTS DIVISION

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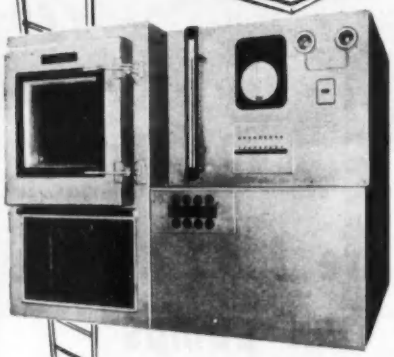

Built of heavy, rolled steel plate for extra-rugged service and great versatility, the standard Tenney Zphere Altitude Chamber provides vacuum conditions that simulate altitudes from sea level to approximately 80,000 feet (0.8" Mercury, absolute). Available temperature range is from + 200°F. to −100°F. Relative humidities range from 20% to 95% at above-freezing temperatures and are limited by the minimum and maximum dew points of 33°F. and 178°F., respectively. Temperature control is held within ± 2°F.

Standard equipment includes electric temperature and humidity recording controllers, altitude gauge, mercury manometer, 8-post terminal panel, and pre-set control for maintenance of altitude. Special features may include high-voltage lead-ins, side viewing windows, hand-operated tuning shafts, high wattage dissipation, utility ports up to 6" diameter. Also stainless steel power shafts, special instrumentation, rapid cooling and heating rates, low temperatures to −150°F., altitudes to 120,000 ft. Also custom-size chambers.

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Los Angeles Representative: GEORGE THORSON & CO.
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8585

Engineers and Manufacturers of Automatic Environmental Test Equipment

Metal Show Program

(*Continued from page* 55)

a program of about 65 papers covering important welding techniques in the Defense industries. Special events during the meeting include the Adams Lecture and the presentation of awards on Monday morning. The educational lecture series on Inert-Gas Metal-Arc-Welding Process will start Tuesday afternoon. Three interesting plant tours have been arranged —the Philadelphia Naval Shipyard, the Naval Air Materiel Center, and the Steam Division of the Westinghouse Electric Corp.

Lowering production costs through non-destructive testing will be the theme of the technical sessions at the 12th annual meeting of the Society for Non-Destructive Testing. They begin October 20 with modern new developments in non-destructive testing equipment, techniques, fields of application, and potential savings being presented by outstanding industrial and management engineering executives.

Forty technical papers have been scheduled for the sessions of the Institute of Metals Division, AIME, which start on October 20 and end October 22. Two symposiums on titanium and titanium alloys have been arranged for October 21 in addition to the regular meetings.

BOOKS . . .

AMERICAN MONETARY POLICY, *by E. A. Goldenweiser, published by McGraw-Hill Book Co., 330 W. 42nd St., New York, N. Y. Price, $4.50.* Published as it is at a time when there is considerable interest in, and indeed some concern over, the relationship of U. S. monetary policy to the stability and progress of the nation's economy, this succinct review of American financial policy and experience during the 36-year period since the establishment of the Federal Reserve System is most opportune. It explains the operation of our central banking system, as well as the general aims of our monetary policy, and surveys their implementation, successfully or unsuccessfully, in an era that included two wars, a boom, and a depression. The author does not permit theoretical vagaries to creep into discussions of the Federal Reserve Board and the economic concepts which motivate its thinking and its actions, but rather draws extensively on first-hand knowledge of the subject derived from his years as an executive member of the Board's staff. This background advantageously makes possible a special feature of the book on suggestions for improvement in the organization of the body.

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SHAKEPROOF ENGINEERING REDUCES ELECTRIC MOTOR ASSEMBLY COSTS!

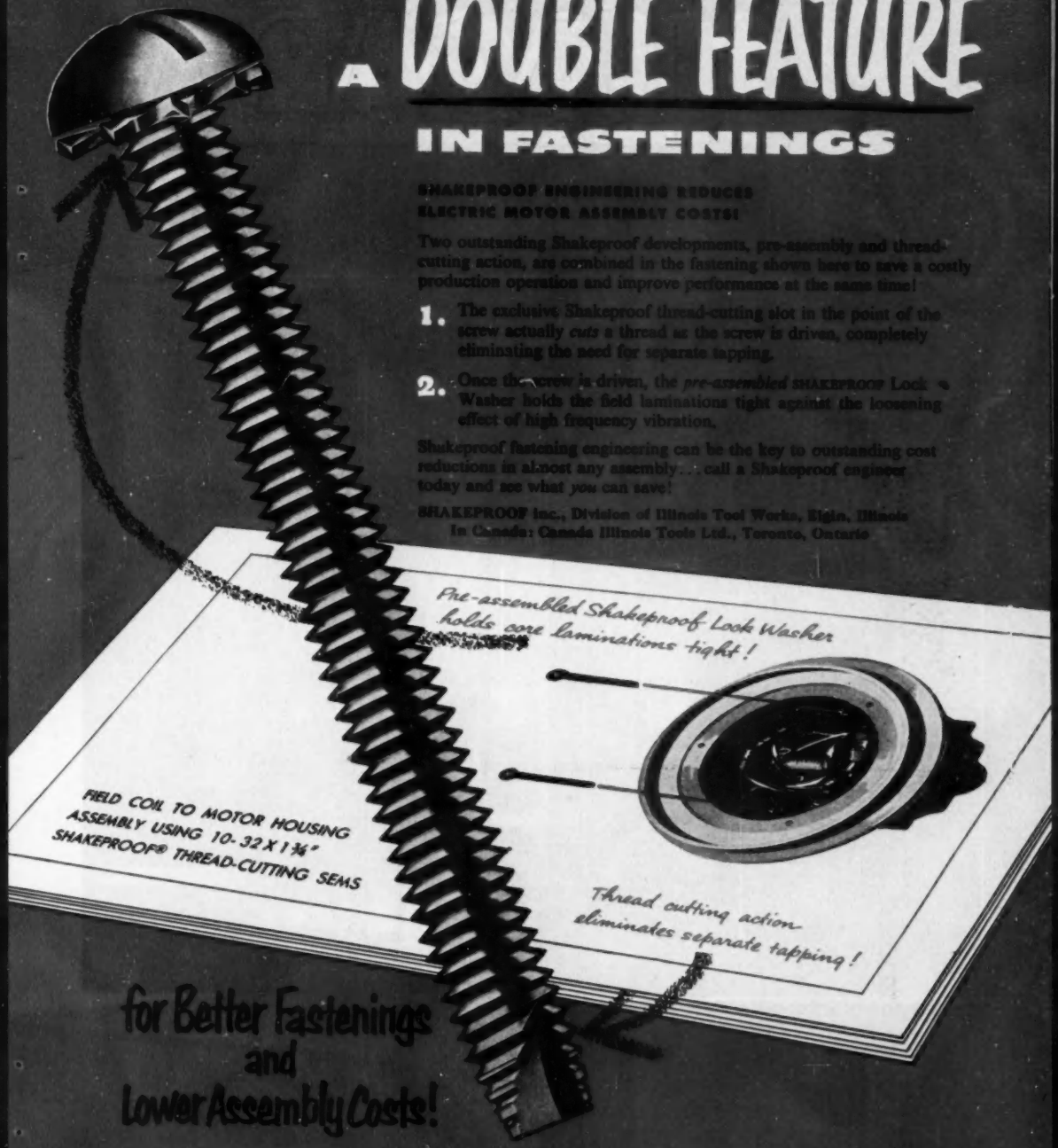
Two outstanding Shakeproof developments, pre-assembly and thread-cutting action, are combined in the fastening shown here to save a costly production operation and improve performance at the same time!

1. The exclusive Shakeproof thread-cutting slot in the point of the screw actually *cuts* a thread as the screw is driven, completely eliminating the need for separate tapping.

2. Once the screw is driven, the *pre-assembled* SHAKEPROOF Lock Washer holds the field laminations tight against the loosening effect of high frequency vibration.

Shakeproof fastening engineering can be the key to outstanding cost reductions in almost any assembly . . . call a Shakeproof engineer today and see what *you* can save!

SHAKEPROOF Inc., Division of Illinois Tool Works, Elgin, Illinois
In Canada: Canada Illinois Tools Ltd., Toronto, Ontario


Pre-assembled Shakeproof Lock Washer holds core laminations tight!
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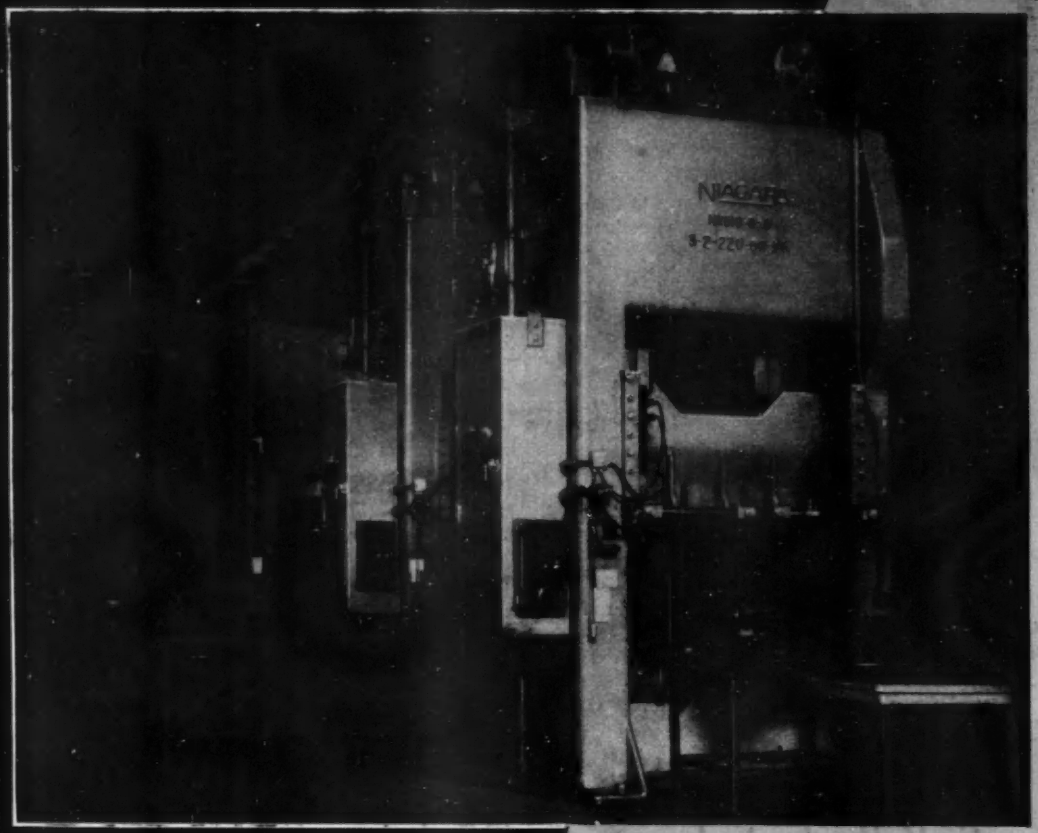

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Future Commercial Vehicle Engine Developments

(*Continued from page* 42)

over-all reduction in size even though its output is not always so high as achieved by the uniflow scavenge system. This engine at 2200 rpm shows a fuel consumption of 0.38 lb per bhp hr, at a bmep of 70 psi. Peak-loadings of 80 psi are indicated by the performance curves.

Another bid for consideration in future power plants is the so-called compound engine. In this development an opposed piston type engine furnishes the energy fed to the turbine which is the source of power for propulsion. The net work is accomplished on the turbine shaft driving the vehicle. This type of power plant is receiving attention for military purposes at the present time. These achievements may ultimately develop the practical potentialities of this system as means for certain types of vehicle propulsion.

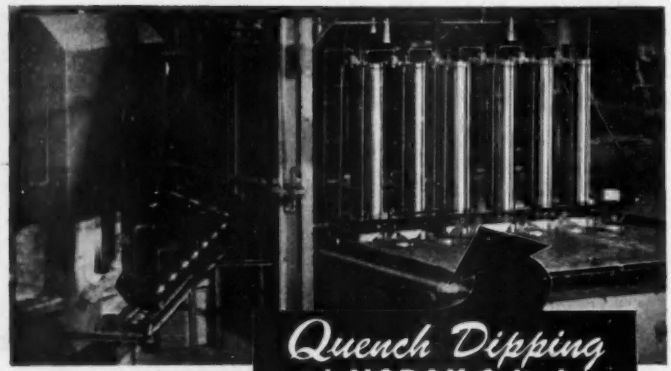
The SIGMA free piston gas generator has operated in France with indicated mean effective pressures up to 230 psi. In this same connection an aircraft development by Ricardo using a two-stroke single acting uniflow scavenged Diesel engine with high supercharge as a heat generator supplying energy to a gas turbine, is reported as yielding fuel consumption below 0.30 lb per bhp hr.

Reference is made to the work of NACA on an investigation of a two-stroke cycle gas generator aircraft engine. Work performed on three types of scavenging systems in piston engines, two of which are of the loop-scavenge type, and one the uniflow type in the opposed piston engine resulted in the following conclusions: The results of this investigation indicate that an engine of the two-stroke cycle gas generator type would provide a power plant of low specific weight and fuel consumption with favorable altitude performance characteristics. It was found possible to operate a two-stroke cycle cylinder at the pressure and temperature levels required for the gas generator engine. Mechanical functioning of the piston engine under gas generator operating conditions was in general satisfactory.

Here we have instances of power plants which on the surface appear complex in the number of units involved, yet may, under the stimulus of engineering development, ultimately lead to opportunities for commercial units in specific installations in the field.

Development of future internal combustion engines is quite well linked with fuel injection equipment economies. Even in engines of the high compression spark ignition type, fuel injection equipment is considered advantageous in obtaining the desired stratification of fuel mixtures. The use of fuel injection equipment is mandatory in all Diesel engines. There is need for concerted effort in the development of fuel injection equipment along lines which produce lower cost mechanisms to achieve expected performance. In this connection the development work conducted by Caterpillar on fuel injection equipment is of interest.

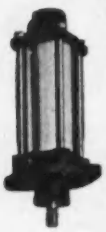
(*Turn to page* 103, *please*)



View of Heat Treating Department, at Gas Machinery Company, shows NOPAK Cylinders which dip baskets of parts into quenching tanks.

Quench Dipping with NOPAK Cylinders

Expedites Heat Treating Cycle . . .



Nopak Model "D" Cylinder similar to those shown in illustration.

At the Gas Machinery Company, Cleveland, Ohio, work-pieces are conveyed from the heat treating furnaces into wire baskets which are then immersed into a quenching bath by a series of NOPAK Cylinders mounted vertically above the quenching tank. After quenching, the baskets are lifted out of the tank by the cylinders, and the parts are transferred to another conveyor, with the aid of another NOPAK Cylinder, for further processing.

This installation is typical of the many materials-handling operations in which NOPAK Valves and Cylinders are used. For others see the NOPAK Application Manual.

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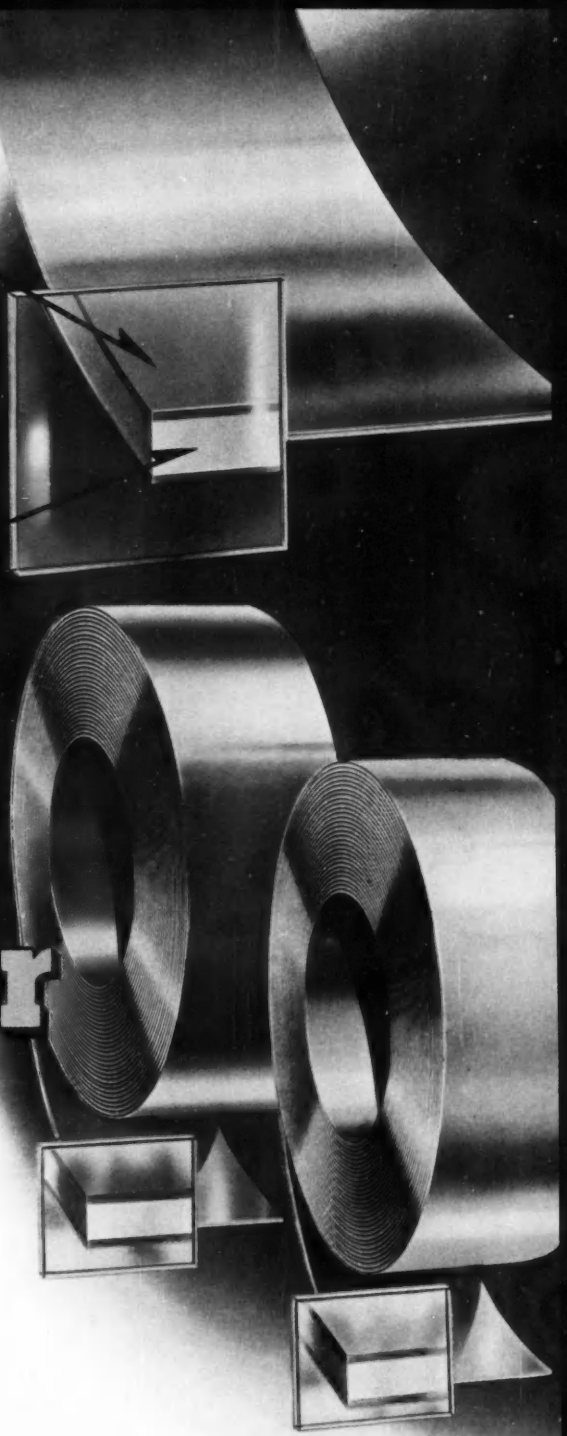

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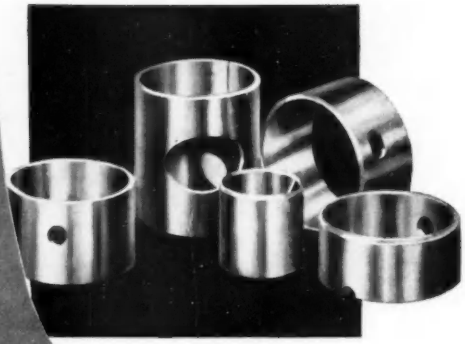

Technical data sheets on babbitt-lined bearings will be sent free on request.

BECAUSE of the many inherent properties of babbitt as a bearing material, it fits into numerous applications. Babbitt provides a natural low coefficient of friction, easy conformability, high imbeddability, good wettability with lubricants, and high corrosion resistance to most oils. Coupled with these features, bronze or steel backing gives the necessary strength to the bearing. The alloy of lead-base or tin-base babbitt and the backing metal can be selected to meet operating conditions.

Through long years of research and experience, Johnson Bronze has developed a method of combining babbitt and either bronze or steel into a durable, lasting bond. This, together with the knowledge of the relative thicknesses of babbitt and backing for utmost efficiency and high quality workmanship, assure you of long, satisfactory service from Johnson Babbitt-Lined Bearings. Our engineers will gladly consult with you on proposed applications. Write for an appointment.

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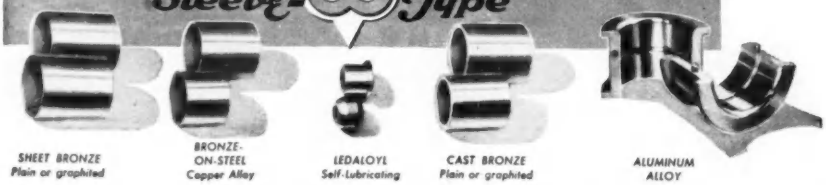

SHEET BRONZE
Plain or graphited

BRONZE-ON-STEEL
Copper Alloy

LEDALOYL
Self-Lubricating

CAST BRONZE
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ALUMINUM ALLOY

(*Continued from page* 100)

The evolution of the fuel pump for the past twenty years is best expressed by the sequence of designs shown in Fig. 7. The original replacement A was fitted with conventional parts for that period.

The design B is a modification for installation in a housing outside the engine, yet sealing the crankcase of the fuel-pump housing from dust and moisture. Designs indicated at C, D, and E are intermediate in development but indicate improvements in the check valve arrangement for achieving superior performance.

Design F represents the most simplified type. It is apparent that considerable reduction in cost has been achieved in the manufacture of this fuel pump and that it is reduced to its essential working parts. The back-flow channel from the lower portion of the barrel engages the lantern channel around the plunger with the oblique drilled hole, permitting the trapped fuel under pressure to be returned to the suction side of the fuel pump. This has resulted in considerable reduction in leakage of the plunger and barrel into the crankcase of the fuel-pump housing.

Figure 8 shows in sections the stages of development which give the line of evolution of fuel-valve developments. At A, the original pintle-type valve is shown. The various stages of development in improving and simplifying the closed type nozzle are shown at B, C, D, and E. Also variations are shown in the design of the precombustion chamber to accommodate itself to the changing characteristics of the fuel-valve.

At F the latest type fuel-valve is illustrated. The fuel-valve assembly is built into a cartridge type package and the fuel-valve needle is an outward opening or "open-nozzle" type. Other modifications are shown to improve the sealing of the chamber in the cylinder head. Further details of this valve are more clearly shown in Fig. 9.

To achieve higher-output engines, effort must be expended toward considerable improvement in pistons and rings. Development of suitable materials which will live under the heat flows experienced at high output and high speeds, must be supplemented with improved knowledge on combustion. There is still a vast field for exploration in achieving the proper loading and scavenging of air to improve the charge to the cylinder and to accomplish proper mixing of fuel and air to promote the rapidity of combustion necessary in achieving

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It's no secret that design experience and engineering skill have put SCHMIEG out in front, where careful planning and reasons of economy are most necessary for specific plant installations.

SCHMIEG Uni-Flow SPRAY BOOTHS offer important advantages in space saving and operating economy.

SCHMIEG Industrial OVENS are recommended by engineers who know, for hundreds of uses that save dollars in plant operations.

So also the SCHMIEG mesh-belt, conveyor type WASHERS, and the automatic circular types which time, index and rotate parts through wash, rinse and blow-off steps—operated by a single worker.

For the very best aids to efficient, money-saving industrial operations, ask the engineers who know*—about SCHMIEG. Then call in *our* engineers to design units ideally suited to your specific needs.

SCHMIEG Centri-Merge dust and fume elimination units have been acclaimed as the best solution to the problem of removing dust and fumes, in any industrial application.

**Write for folder giving partial list of users.*

Those photographs of SCHMIEG finishing equipment recently installed in the ultra-modern plant of a large manufacturer of kitchen equipment and other metal specialty items.

Above is SCHMIEG air supply equipment located in the building penthouse. During operation, doors in equipment enclosure are closed. Stack and fan is one of five stacks from spray booths on the floor below.

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Engineers & Manufacturers

A simple way to stop shipping damage

You can protect your product from being broken or marred in shipment by cushioning it with Armstrong's DK-153 Tape. Simply place DK-153 at all points of contact between the case and the product. The item being shipped will then float on a shock-absorbing cushion of cork-and-rubber.

DK-153 is easily applied. Just peel off the cloth backing and press the tape into place. The pressure-sensitive adhesive sticks tight instantly to any clean, dry surface.

Armstrong's DK-153 comes in tapes of various widths and thicknesses and in sheets, rolls, or die-cut shapes. For samples, write on your company letterhead to Armstrong Cork Company, Cork-and-Rubber Products Department, 8510 Arch Street, Lancaster, Pa. Available for export.

ARMSTRONG'S DK-153 TAPE

completeness for efficient burning. The two developments must go hand in hand.

Above all, there is a great need for simplicity of design, as a general rule, in all power plant projects. There has been too much effort toward the accumulation of gadgets and extraneous accessories of no essential value in improving the thermodynamic performance of the power plant. Friction horsepower has been moving upward because of the additions of accessories and gadgetry which do not contribute to the ultimate economy of operation.

Future power plants must be concerned with the improvement of the cyclic efficiency and the proper allocation of temperature levels in relation to the capacity of parts to furnish adequate heat transfer.

Avenues of advance open to the combustion engine for progressive strides toward the horizon of probability in higher ranges of output and higher zones of speed with reasonable maintenance are:

1. Control of the flame front of the gas injected, or otherwise introduced combustible, to prevent destructive concentration of heat flow through metals.

2. Equalization of heat transfer through the main combustion chamber envelope to relieve cylinder head and piston structures of undue mechanical and thermal stresses.

3. Development of adequately matched and efficient superchargers.

4. Continued improvement of materials and lubricants.

5. Provision for controlled thermal levels throughout the geometry of the engine in order to stratify temperature ranges for maximum efficiency and effective cooling.

6. Achievement of over-all economy by the utilization of economically available fuels.

The foregoing article is from a paper presented at the SAE National West Coast Meeting held recently in San Francisco, Calif.

Humanitarian Awards Go To Three Detroit Executives

The first annual humanitarian awards by the new car dealers division of United Jewish Appeal were presented to vice-presidents of three Detroit automobile makers, at a dinner in New York, Sept. 17. Recipients of the awards were W. F. Hufstader of General Motors Corp., A. vander-Zee of Chrysler Corp., and Walker A. Williams of the Ford Motor Co.

announcing VICKERS

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HYDRAULIC MOTORS

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(Above) Series 200 Vickers Hydraulic Motors available in two sizes with flange or foot mounting.

(At Right) Series 500 Vickers Hydraulic Motors available in two sizes with flange or foot mounting.

COMPACT - LOW WEIGHT

EXCLUSIVE "ROCKING BEAM" CONSTRUCTION

DYNAMIC BALANCE AND QUIET OPERATION

COMPANIONS TO VICKERS BALANCED VANE TYPE PUMPS

Two series of Vickers Balanced Vane Type Hydraulic Motors are now in production. They offer many advantages for the economical and efficient application of variable speed rotary mechanical power to machine tools, industrial machinery and mobile equipment. Some of their important features are mentioned above; for further information get in touch with your nearest Vickers Application Engineering Office.

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ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

4935

News of the

MACHINERY INDUSTRIES

(*Continued from page* 54)

a machine tool company does not have or is not obtaining sufficient rated orders. It is felt in management circles that the Government will put a freeze on all machine tool orders in 1953 so that unrated orders can be delivered along with rated orders, and so that rated orders received after the freeze period goes into effect will have to be delayed until unrated orders can be shipped. Another belief is that regulation M-41 will be discontinued early in 1953, except for very critical machine tools. Although the current backlog of machine tools as reported by the NMTBA stands at something like 12 months' production, we have found among the builders visited that their backlog is somewhere between one and 11 months.

New Plant for Norton

While at Norton Co., we noted that it is moving its machinery to a new $6 million, 6½ acre plant. All types of Norton's surfaces, cylindrical, roll, tool room, and special grinders, and lapping machines will be made in this new plant, which will add 50 per cent to the firm's present capacity.

Machine Tool Week

Machine tool builders in the Springfield and Windsor, Vermont, area are holding their Machine Tool Week which started October 12. Machine tool companies in this area have placed booklets and photographs relating to their equipment in various retail stores. These displays serve the purpose of showing what part a machine tool plays in making a finished product, whether it be an automobile or a shoe. Many of the people working on the affair are hoping that the idea will catch on nationally, since it is felt that machine tools play the role of America's unsung production hero.

NPA Hit

One of the major faults that the builders have found with the NPA is that they did not get sufficient material ratings when needed last year. This shortage has caused a bottleneck in production this year. Many feel that the Government officials are not foresighted enough to understand what is required by machine tool builders for lead time.

Huge Presses for Air Force

A 25,000 ton press and a 35,000 ton press will be built by E. W. Bliss Co. for the U. S. Air Force program. These two immense presses, which weigh about 5000 tons each, are said to be the largest to be manufactured in this country. Each press is estimated to cost $6 million; the smaller one will be delivered in 1953, while the larger of the two should be completed in 1954. Both units will be used for jet aircraft production.

One Billion for '52

According to the NMTBA, the industry is producing at a rate of about $100 million per month. This is by contrast to an average of $20.7 million per month in 1949. Total shipments for 1952 are expected to reach or exceed $1 billion.

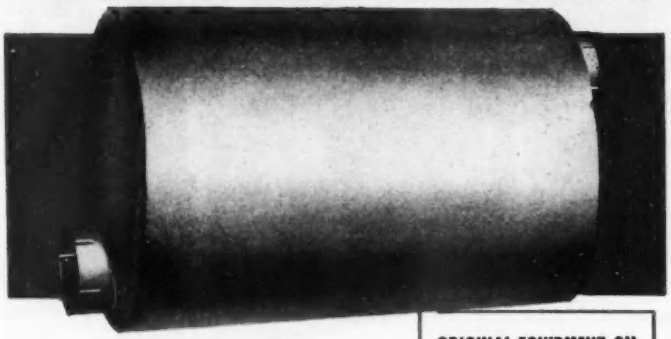
The association reports that the cancellations of orders of machine tools for national defense are still heavy in proportion to new orders. In August, they equaled 14 per cent of new orders received. According to the NMTBA, there are three major items affecting tool cancellations. They are:

1. Machines originally ordered in excessive requirements and cancelled after a resurvey.

(*Turn to page* 108, *please*)

Greater noise reduction — without back-pressure penalty wins Industry-wide acceptance for

Donaldson HEAVY-DUTY Mufflers



When a muffler rates FIRST in official tests on a basis of superior noise reduction without back pressure penalty . . . when that muffler proves its ability to stand up longer, it's certain to win approval by the trucking industry. That's what has happened with the Donaldson Heavy-Duty, Fully-Engineered Muffler. Leading heavy truck manufacturers specify Donaldson Mufflers as original equipment; many cost-conscious fleet operators have standardized on Donaldson Mufflers for replacement.

If you operate a fleet, see your local heavy truck dealer. Manufacturers, write for specifications.

ORIGINAL EQUIPMENT ON THESE FAMOUS MAKES

Sterling
Autocar
Kenworth
Euclid

DONALDSON COMPANY, INC.

666 Pelham Blvd., St. Paul 4, Minn.
Grinnell Division: Grinnell, Iowa
Donaldson Company (Canada) Ltd., Chatham, Ontario

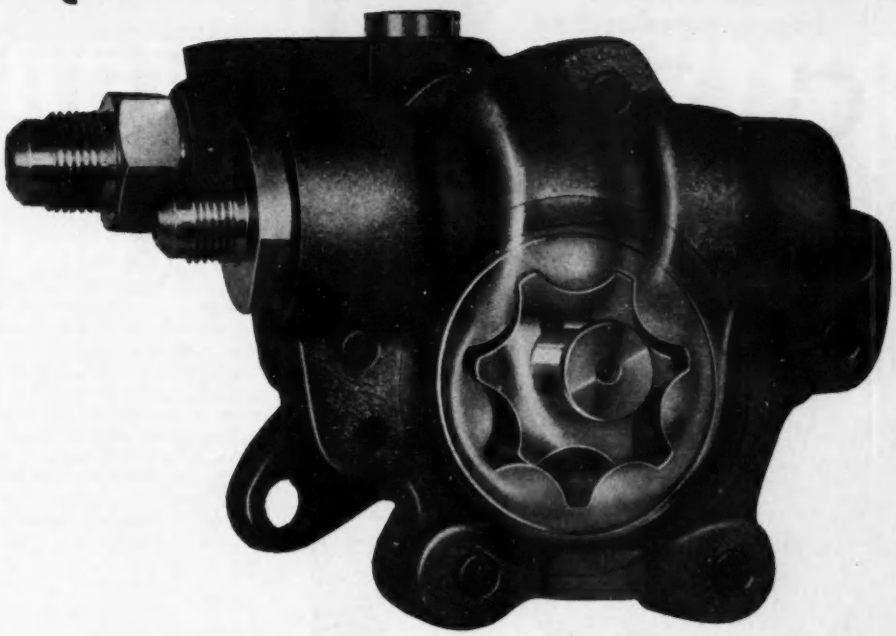
Donaldson

Made and guaranteed by the Donaldson Company

MUFFLERS

world's largest manufacturers of heavy duty air cleaners

Compact Power for Power Steering



Eaton Rotor Pumps with Flow-Control

Where space is at a premium, the Eaton high-speed power unit provides the advantage of small, compact design. As a pioneer in the development of pumps with flow control for hydraulic power steering, the Eaton Pump Division offers unequalled facilities in both design and production. If you are considering power steering, there are distinct benefits in permitting our engineers to work with yours in the early design stages.

EATON MANUFACTURING COMPANY

GENERAL OFFICES: CLEVELAND, OHIO

EATON *Pump Division* · 9771 French Road · Detroit 13, Michigan

120%
more production
with this
Cincinnati
cleaning machine
working for the
F. W.
Wakefield
Brass Company
Their CINCINNATI installation has upped cleaning production 120%, reports Wakefield. This manufacturer of lighting equipment states in addition . . .
"Actual cleaning time and phosphate treating time has been increased by 50%, producing maximum phosphate effectiveness."
Further savings are cited by Wakefield . . .
"Cincinnati's utilization of the hot gases from wash and hot rinse solutions for drying purposes results in a saving of 300,000 BTU's of gas per hour."
Cincinnati will show you how to effect similar improvements. No obligation . . .
THE CINCINNATI CLEANING & FINISHING MACHINERY CO.
315 Hecla Street, Ironton, Ohio

News of the

MACHINERY INDUSTRIES

(*Continued from page* 106)

2. The stretch-out of the national defense program which has put many projects farther forward in the future.
3. Inability of Washington to decide definitely what to produce and the sequence in which projects should be undertaken.

Gear Index

Starting with the July index of gear production, the American Gear Manufacturers Association is calculate its figures on a new base. The new method will utilize 1947-1948-1949 = 100 as the base and reports are being made up from the over 50 reporting companies. This is in comparison to the old base of 1935-39 = 100 and the 20 reporting companies.

For July, using the new base, the index figure is computed to be 145.3. The AGMA index for August is 132.3, a decrease of 8.9 per cent as compared with July.

AIRBRIEFS

(*Continued from page* 72)

be the principal objective of the industry and this can be accomplished in two ways: (1) increase ability to handle small-lot production runs more efficiently, to incorporate frequent changes at less cost and to remain on schedule to avoid costly dislocations and delays in production; and (2) provide improved automatic and mechanical methods and equipment for building airplanes more quickly and standardize design details to the greatest extent possible.

Off-Shore Snarl

Still the Mutual Security Agency is attempting to get rid of that $225 million fund voted by Congress for "off-shore procurement" of military aircraft. There have been more decisions and counter-decisions on the matter in the past three months than is normal for a program with a logical objective. It will be recalled that the program has variously: (1) made outright gifts of the funds to NATO countries to help them buy their own

(*Turn to page* 113, *please*)

KELSEY-HAYES

POWER-BRAKING

Leads in Safety and Ease of Operation!

It's the Kelsey-Hayes "Vacdraulic" Brake Power Booster for "Feather-Touch" Control.

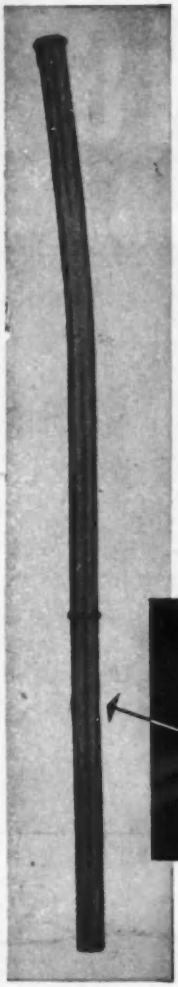
Proven Superior for right or left foot low-pedal operation!

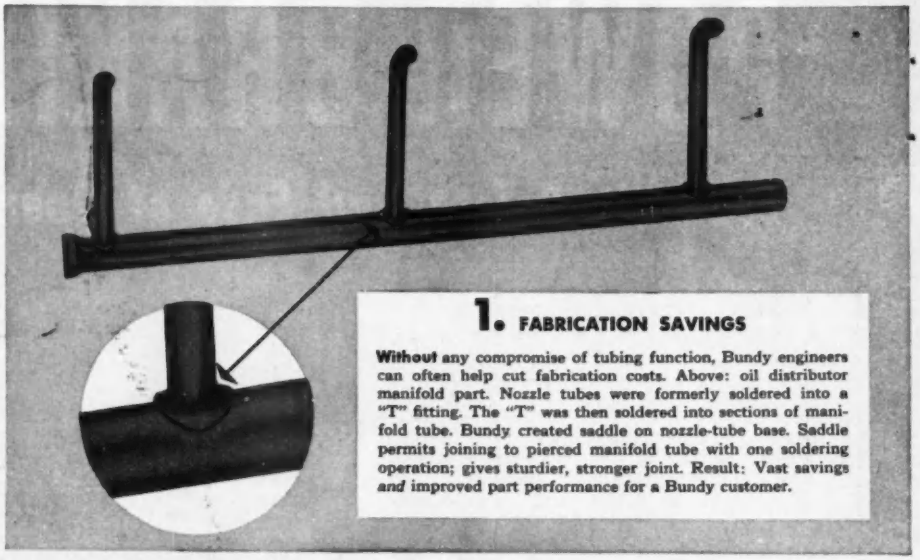
K-H ASSURES PROVEN PRODUCTS AT

KELSEY-HAYES WHEEL COMPANY
DETROIT 32, MICHIGAN

PRODUCTS: Wheels—Hub and Drum Assemblies—Brakes—Vacuum Brake Power Units—for Passenger Cars, Trucks, Buses—Electric Brakes for House Trailers and Light Commercial Trailers—Wheels, Hubs, Axles, Parts for Farm Implements.
PLANTS: Kelsey-Hayes Plants in Michigan (4); McKeesport, Pa.; Los Angeles, Calif.; Davenport, Iowa; Windsor, Ontario, Canada.

Your greatest automotive





1. FABRICATION SAVINGS

Without any compromise of tubing function, Bundy engineers can often help cut fabrication costs. Above: oil distributor manifold part. Nozzle tubes were formerly soldered into a "T" fitting. The "T" was then soldered into sections of manifold tube. Bundy created saddle on nozzle-tube base. Saddle permits joining to pierced manifold tube with one soldering operation; gives sturdier, stronger joint. Result: Vast savings *and* improved part performance for a Bundy customer.

2. DESIGN SAVINGS

It is Bundy policy to do everything possible to meet a customer's specifications. But frequently Bundy men can find a way to redesign a part at considerable savings. Above: oil dip stick tube. Customer specified expanded tube diameter below upset to assure press fit in crankcase. After examining drawings, Bundy engineers suggested cheaply made offset bend below upset. Offset provides effect of press fit without expense. Too, Bundy suggested slight bend above upset to keep dip stick from rattling. Customer received a better functioning part produced at lower cost.

Bundyweld® Tubing

DOUBLE-WALLED FROM A SINGLE STRIP

WHY BUNDYWELD IS BETTER TUBING

Bundyweld starts as a single strip of copper-coated steel. Then it's . . .

continuously rolled twice around laterally into a tube of uniform thickness, and

passed through a furnace. Copper coating fuses with steel. Presto . . .

Bundyweld, double-walled and brazed through 360° of wall contact.

← **NOTE** the exclusive patented Bundyweld beveled edges, which afford a smoother joint, absence of bead and less chance for any leakage.

Bundy Tubing Distributors and Representatives: Cambridge 42, Mass.: Austin-Hastings Co., Inc., 226 Binney St. • **Chattanooga 2, Tenn.:** Folsom-Deakins Co., 823-824 Chattanooga Bank Bldg. • **Chicago 32, Ill.:** Lapham-Hickey Co., 3333 W. 47th Place • **Elizabeth, New Jersey:** A. B. Murray Co., Inc., Post Office Box 476 • **Philadelphia 3, Penn.:** Ruten & Co., 1717 Sansom St. • **San Francisco 10, Calif.:** Pacific Metals Co., Ltd., 3100 19th St. • **Seattle 4, Wash.:** Eagle Metals Co., 4755 First Ave. South **Toronto, Ontario, Canada:** Alloy Metal Sales, Ltd., 181 Fleet St., East • **Bundyweld nickel and Monel tubing is sold by distributors of nickel and nickel alloys in principal cities.**

tubing buy on every count

Choose Bundyweld Tubing and you buy *proved*, safe performance; unmatched tubing features; engineering skills that make "impossible" parts possible and cut costs at every turn. *Look* at all you buy in Bundyweld Tubing:

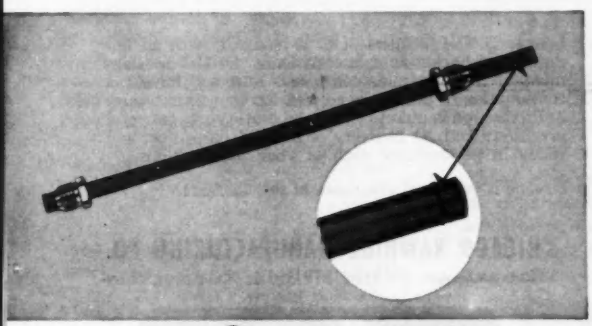
You buy priceless, safe tubing performance, proved in billions of miles traveled by millions of trucks, cars, buses and tractors with brake lines of Bundyweld Tubing. In the last 20 years, over two billion feet of Bundyweld have been used in those brake lines alone.

You buy unmatched tubing features. Bundyweld is the *only* tubing double-walled from a single strip with beveled edges. Its extra-strong steel walls are copper-brazed through 360° of wall contact. On the job, Bundyweld sails past shock, stress, strain. It has high endurance limit. It's leakproof. In production, Bundyweld goes through its paces without balking, bends easily, machines easily, handles easily.

You buy unsurpassed engineering skills. Many Bundy customers bring design problems to Bundy engineers; get simpler, cost-saving, tubing-part designs — *without* any compromise in function. If a customer wishes, Bundy will take over complete fabrication of a part — turn it out in large quantity, with an eye on accuracy and cost. Whether you need tubing in lightweight, easy-handling lengths for fabrication yourself, whether you need design or fabrication help, or whether you need fast delivery of finished parts, Bundy is equipped to answer your needs.

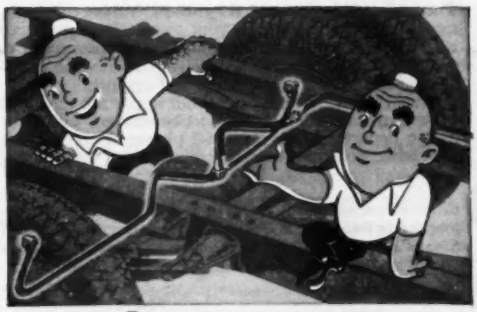
Whether they think of cost or performance — or both — the world's finest automotive engineers know there is no adequate substitute for Bundyweld Tubing — or Bundy skills.

Contact a Bundyweld Distributor (listed lower left), or write direct to *Bundy Tubing Company, Detroit 14, Michigan*



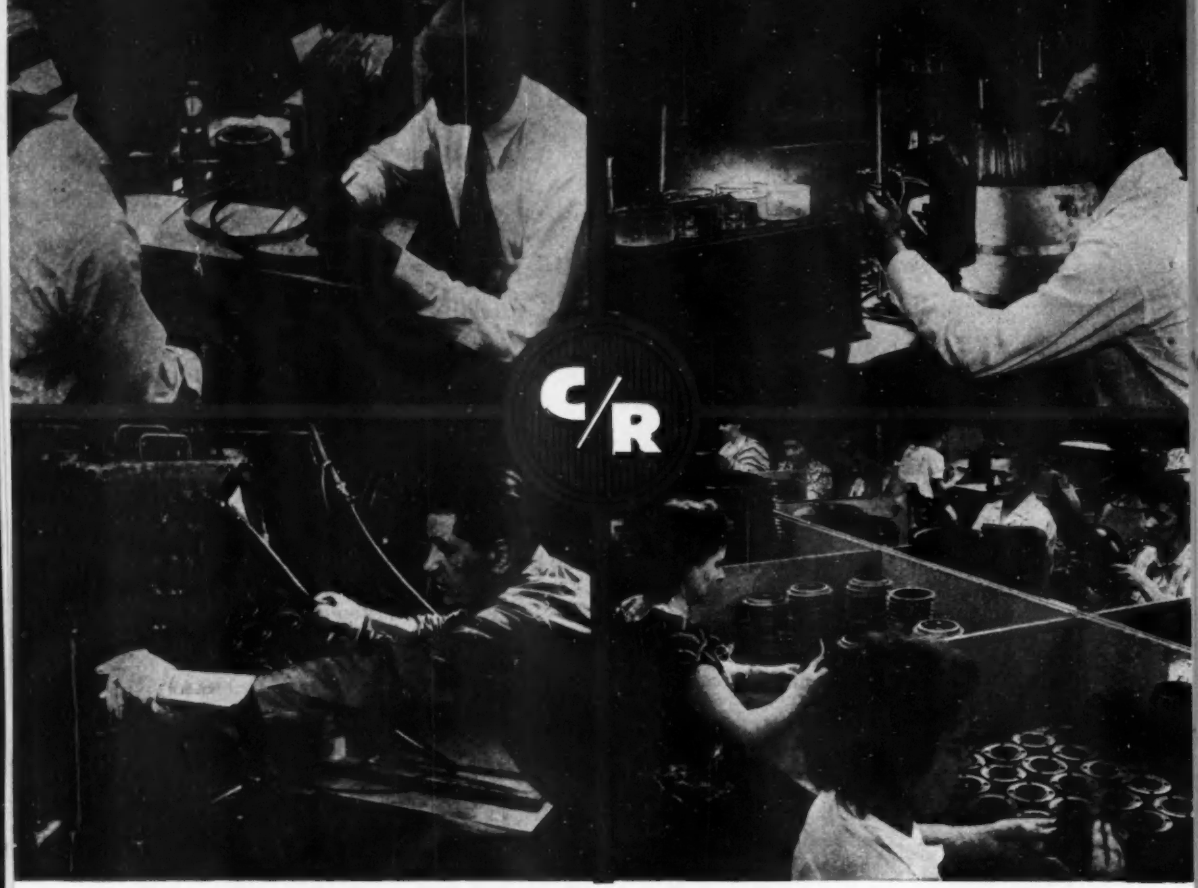
3. COST SAVINGS

Bundy leaves no stone unturned in search of ways to cut costs. For instance, Bundy fabricates simple truck fuel-line part above (of tinned Bundyweld). Customer wanted part shipped with sleeve-type compression fittings mounted on it. Bundy added small, non-interfering fin to each part end. Result: Fin keeps fittings from sliding off tubing part during shipping and subsequent handling, eliminates otherwise expensive packaging, eliminates cost of remounting fittings that would have slipped off.



4. PERFORMANCE SAVINGS

You save because of Bundyweld's safe, sure performance during the life of your trucks, cars, buses, tractors, or other automotive equipment. *Priceless* performance delivered at lowest cost consistent with Bundyweld quality. *Proved* performance delivered in fuel, oil, and brake-line systems of 95% of today's cars — fine testimony to Bundyweld reliability.



FOUR MEANS TO AN END

The end is this: a molded synthetic rubber part, designed exactly right to fit your mechanism; produced with the correct resistance and physical properties to suit your specifications; and delivered with the assurance of completely satisfactory performance.

Chicago Rawhide offers you four important means to achieve this end. They are: 1) Cooperation with your design department to check all phases of the Sirvene part while your new mechanism is still on the drawing board; 2) The facilities of C/R research, with an unduplicated background of experience, for the development of the particular compound that will have the combination of properties correct for your application; 3) Production in quantity, with laboratory-like care and precision; And, 4) Delivery of finished parts that will verify in performance each of your specifications.

Sirvene is your best assurance of satisfaction!

Cooperative research and engineering which Chicago Rawhide has provided in helping other leading manufacturers develop special Sirvene synthetic rubber parts are available to you. We will be pleased to send you a copy of "Engineering with Sirvene."

CHICAGO RAWHIDE MANUFACTURING CO.

1310 Elston Avenue SIRVENE DIVISION Chicago 22, Illinois

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Machanical Leather Products

Boots, diaphragms, packings and other products give dependable service under difficult operating conditions.

PERFECT Oil Seals

C/R seals are used in more motor vehicles, farm implements and industrial machines than any other shaft-type sealing device.

C/R SIRVENE

SCIENTIFICALLY COMPOUNDED ELASTOMERS

Representatives in These Principal Cities: Boston • New York • Syracuse • Philadelphia • Pittsburgh • Cincinnati • Cleveland • Detroit • Peoria • Minneapolis • Kansas City • Houston • Los Angeles • San Francisco

AIRBRIEFS

(*Continued from page* 108)

airplanes; (2) provided money for NATO countries to build airplanes to be turned over to a "pool" from which a country cannot draw its own airplane; (3) permit foreign countries to build U. S. aircraft and parts; and (4) actually purchase foreign airplanes for the USAF. Latest idea is for the MSA to actually buy British, French and Italian-built airplanes with their distribution to be determined by—of all people—the U. S. Joint Chiefs of Staff (who have no direct connection with NATO at all!). Meanwhile, Ken Ellington, assistant-to-the-president at Republic Aviation Corp. (whose F-84 Thunderjet has been going abroad to NATO countries for the past year), said in a recent speech: "In some instances technical know-how and designs, developed at great expense by American industry, have been turned over to foreign firms with no compensation for the property rights involved and without safeguards for the future commercial markets of the U. S. firms." Ellington, former wartime Aircraft War Production Board executive, believes that the proper way to handle the program is for a free enterprise negotiation of licensing agreements with royalties and patent rights protected.

Emergency Loses Steam

As outlined here some months ago, the resignation of Charles E. Wilson as defense production head removed not only the keystone but most of the impetus behind the "emergency defense build-up" character of the status quo. Following much pulling and hauling, Henry H. Fowler finally was named Director of the Office of Defense Mobilization. Fowler also continues as head of the Defense Production Administration, an indication of the reduced level of activity of both agencies. Now Fowler says that he will resign at the end of the year, and Washington observers are confident that the whole operation will quietly fold, most certainly if Eisenhower is elected. The only spark plug left in the program is Hugh Dean, former General Motors manufacturing vice-president, who is now special assistant to Defense Secretary Lovett. Lovett and Dean are quietly picking up the reins as the emergency agencies drop them and will have the whole program within the framework of the Department of National De-

(*Turn to page* 114, *please*)

THE DRUM THAT CAN'T BE BEAT!

Phil Walters, 1951 Watkins Glen winner, pointing to Al-Fin Bonded bi-metallic brake drum used on Cunningham cars in the Le Mans 24-hour race.

FIRST FOUR CARS IN LE MANS 24-HOUR ROAD RACE USED AL-FIN BRAKE DRUMS

Sharp curves and many corners make the 24-hour Le Mans (France) race the most grueling in the world. Braking is sudden, hard, frequent. And this year the day was scorching, the speeds terrific—up to 173 m.p.h. on the short straight-aways, 96.67 m.p.h. average for the winner!

The first four cars—in fact, six out of the first ten—were all equipped with Al-Fin bonded bi-metallic brake drums. And Daimler-Benz, makers of the two leading cars, pronounced the Al-Fin drums "in absolutely flawless condition after the race."

Latest in a spectacular series of racing successes, this Le Mans triumph clearly points to better braking for American cars—achieved by the patented Al-Fin molecular bonding process, which bonds a cast iron friction surface to an aluminum housing that carries the torque and dissipates heat.

Write for the new Al-Fin Technical Booklet that illustrates not only brake drums but many other important Al-Fin bonded products—pistons, sleeve bearings and bushings, timing gears, engine housings, etc.

AL FIN
DIVISION OF
ENGINE AND AIRPLANE CORPORATION
FAIRCHILD
FARMINGDALE, L.I., N.Y.

AIRBRIEFS

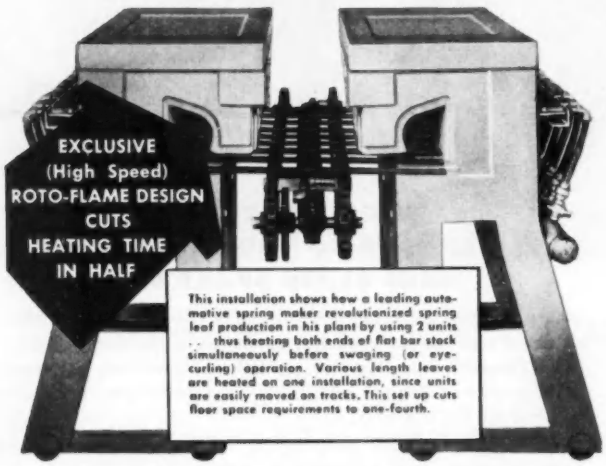
(*Continued from page* 113)

fense by the end of the year. But then Lovett, too, is leaving this fall. The Controlled Materials Plan, now only a shred of its former size, will be dropped altogether by the end of the year with the probable single exception of steel, which insiders say will continue under allocation. Thus nears an end of the historic Administration approach to international tension—creating a flock of emergency agencies. Aircraft production will return entirely to the military fold by the end of the year insofar as design and requirements are concerned, leaving only the perennial problems of machine tools, materials, and manpower for civilian control in Washington. All of this until such time as Joe Stalin again rattles his sabre.

Siamese Engineers

The acute shortage of aeronautical engineers has been well publicized over the past five years with little if any increase in the supply. Recent statistics show that not only is the percentage of electronics graduates increasing but that many heretofore "aeronautical" engineers, seeing the handwriting, are passing over into the electronics field. Eventually, of course, the aircraft will be but a cylindrical metal shell into which is poured several thousand pounds of electronic equipment. Thus, electronics students are, more and more, becoming identified as potential "aeronautical engineers" insofar as their ambitions are the aircraft field rather than the classic electrical and communications fields. Again, however, the engineer shortage in the electronics field far, far surpasses that of the aircraft industry, which has a very large engineering employment dating back many years. Latest is the fact that the budding Canadian electronics industry is enticing away U. S. electronics engineers by very much higher salaries.

Twin ROTO-FLAME FURNACES
QUADRUPLE "END HEATING" PRODUCTION


EXCLUSIVE
(High Speed)
ROTO-FLAME DESIGN
CUTS
HEATING TIME
IN HALF
This installation shows how a leading automotive spring maker revolutionized spring leaf production in his plant by using 2 units . . . thus heating both ends of flat bar stock simultaneously before swaging (or eye-curling) operation. Various length leaves are heated on one installation, since units are easily moved on tracks. This set up cuts floor space requirements to one-fourth.

Boosts Production. Steps up output through much faster heating . . . provides a uniform controlled flow of work at a uniform temperature.

Cuts Operating Costs. Requires less labor, operation can be made 100% automatic . . . saves fuel, no wasted heat . . . saves floor space . . . prolongs die life by virtually eliminating scale.

Provides Better Working Conditions. Exclusive design deflects heat away from operator and onto the work . . . cleaner—utilizes any type of gas fuel.

Just as the Roto-Flame Furnace has increased production efficiency for this well-known spring manufacturer, it can do the same for you . . . whether end heating is required for forging, swaging, upsetting, threading, hardening, or annealing. Ask for Bulletin No. 350.

GAS APPLIANCE SERVICE, INC.
Industrial Gas Engineers
1221 WEBSTER AVENUE • CHICAGO 14, ILLINOIS

Test Cell Protection

(*Continued from page* 33)

The company also is installing an air scavenging system in the long, 48-ft-wide corridor between the banks of test cells. At each end of the corridor, two ducts will be led down from the ceiling to within one ft of the floor. Each pair of ducts will be connected to a main duct leading to an exhaust fan with a capacity of 20,000 cfm. Operation of both fans will be controlled by an eight-point MSA Combustible Gas Alarm system. When this instrument detects a vapor concentration in any of the eight sampling locations in the corridor, the fans will be started automatically to exhaust the vapors. The alarm also will have visible and audible signals to warn personnel. A recording potentiometer on this system will keep track of variations in vapor concentrations as detected by the analyzer.

AUTOMOTIVE INDUSTRIES . . .
is your News Magazine of Automotive and Aviation
MANUFACTURING

Here's your best production team...

EATON Springtites and Sems

FOR MORE production economies, and improved product quality with tighter assemblies . . . Eaton Springtites and Sems can be "your best production team." They cut waste motions on fastening assemblies (from 8 to 3!) . . . and automatically keep bolted assemblies tight and under constant tension. Eaton Springtites and Sems (bolts or thread-cutting screws with pre-assembled Reliance spring lock washers or multitooth washers) are profitably used by many manufacturing firms. Prove to yourself that these economies are possible on your production line...a trial will convince you. Write today for complete Engineering data and samples.

COMPLETE ENGINEERING DATA S-49 and S-49A

There's complete engineering data folders on Eaton Springtites and Sems waiting for you without obligation. Engineering data folder S-49 completely describes types, sizes and kinds of Eaton Springtites and Sems. Data folder S-49A describes thread-cutting EATON Springtites and Sems. Request them on your letterhead today.

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EATON

MANUFACTURING COMPANY, RELIANCE DIVISION

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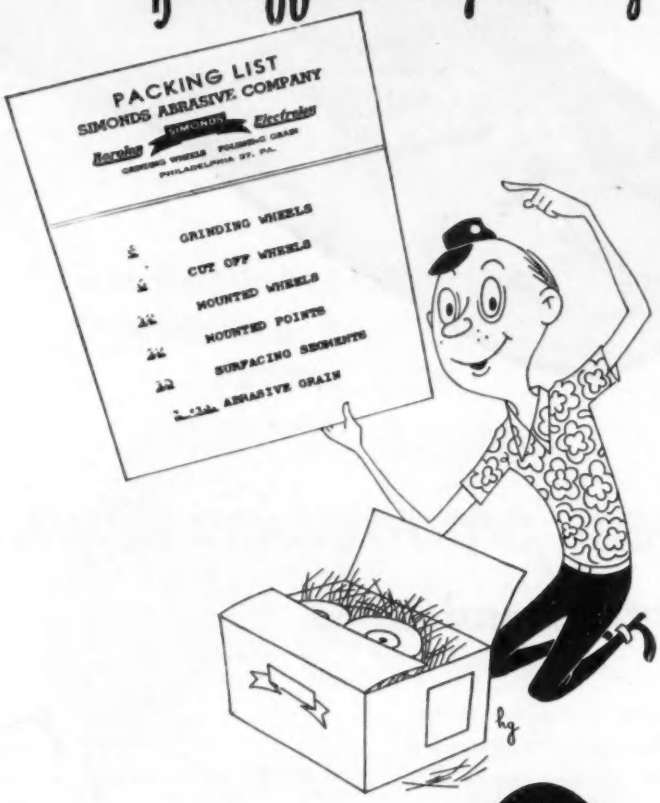
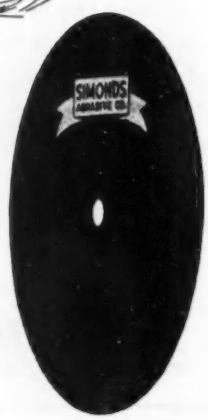
Winning Ticket for efficient grinding



Top grinding results per grinding wheel dollar! That's the essential economy "plank" in any "platform" for productive grinding. And that's where your Simonds Abrasive Co. distributor can be of real help to you.

He carries Simonds Abrasive Company grinding wheels for all your jobs. They're quality-controlled for lasting performance . . . and accurately specified to enable you to order the ones that conform exactly to your needs.



Send for free data book and name of your distributor.

SIMONDS ABRASIVE CO. PHILADELPHIA 37, PA. BRANCH WAREHOUSES CHICAGO, DETROIT, BOSTON; DISTRIBUTORS IN PRINCIPAL CITIES

Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N. Y., Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que

BUSINESS PULSE

(*Continued from page* 70)

Incoming data indicate that retail sales in nearly all categories were running moderately above comparable 1951 levels during August and early September. A notable exception was the experience of department stores in metropolitan New York, which have seen sales run below comparable 1951 totals for 23 successive weeks.

The suspension of Regulation X by the Federal Reserve System is viewed with favor by merchants. They expect that the easing of down-payment requirements will stimulate purchases of new homes, bringing improvement in furnishing and appliance trades. Another encouraging development from the standpoint of the merchant is the indication that consumers are beginning to spend a larger percentage of current income than was the case earlier this year. The high savings-to-income ratio which has prevailed since early 1951 has frequently been cited as a prime reason for sales sluggishness in many categories, and so a decline in this ratio would be highly welcome.

No Inflationary Pressure

Talk of inflation has become much less prevalent in recent weeks than was the case immediately after the settlement of the steel strike. Prices are generally firm, but in no area is there any real evidence of runaway pressure. The consumers' price index moved ahead again between mid-July and mid-August, but the increase was very small, only 0.2 per cent. The wholesale price index of the Guaranty Trust Co., which reflects movements in the prices of basic commodities, showed virtually no change during the thirty-one days ended September 15. This was true as well of the wholesale price index of the Bureau of Labor Statistics.

An important factor working to restrain price advances has been the realization that the damage done to the nation's crops by summer drought was much less severe than originally feared. Indeed, the latest crop reports indicate over-all improvement in agriculture during August and early September, with prospects very good that total farm output this year will approach the record levels of 1948 and 1949. Also of importance in checking upward price pressure has been the Federal Reserve's action in restricting the availability of credit.

(*Turn to page* 118, *please*)

C-D-F makes all three!

low cost Spiral Tubing

Designers, engineers, production men everywhere are changing their thinking (and specifications) over to economical C-D-F spiral tubing. Whether it's round, square, or rectangular, C-D-F tubing is stiff, sturdy, crush resistant. It has good tensile strength, along with good dimensional stability under varying atmospheric conditions.

Above all, it is low in cost. C-D-F experts in insulation, recommend spiral tubing for coils and structural spacers. For transformers, switches, selenium rectifiers.

The round tubing ranges from ⅛" to 6", with wall thicknesses from .0075" to ⅛". The minimum ID of the square and rectangular tubing is ⅜", with 2⅛" the maximum ID. 1/16" is the maximum wall thickness. All tubing can be supplied in lengths from 2' to 4'. From our own fabricating experience, we know you will find this sturdy material easy to drill, tap, rivet, flute or thread.

Think it over . . . then talk to the man from C-D-F, a skilled plastics engineer. C-D-F has sales offices in principal cities with modern test laboratories at all plants. C-D-F spiral tubing. The man from C-D-F. *Both* are good to know!

FOR LITTLE COILS . .

C-D-F puts notches in so that cores can be inserted and accurately adjusted. Hard to crush, this tube withstands prolonged heat of 190°F., 240°F. intermittently. Write for samples and complete specifications. For availability, economy, adaptability . . . buy your spiral tubing from C-D-F.

C D F

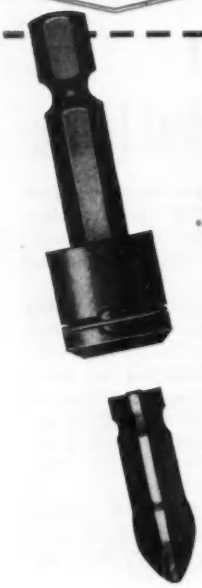
Continental-Diamond Fibre Company

NEWARK 2, DELAWARE

PARK-O-METER

discovers

HY-PRO PHILLIPS INSERT BITS



The Macnick Division of the Rockwell Register Corporation makes this famous "Nickel Grabber" in Tulsa, Oklahoma.

Before Macnick discovered and started to use Hy-Pro Phillips Insert Bits for their glass-mounting operation in the assembly department of the Park-O-Meter case, they had screw-driving troubles. Their Phillips Tools lasted only seven or ten days and drove only 60,000 recessed head screws before they had to be taken off the assembly line and resharpened.

Now, with the Continental Screw Company's New Hy-Pro Phillips Insert Bits, Park-O-Meter drives approximately 420,000 screws. And, the Hy-Pro Phillips Insert Bits last from seven to eight weeks before replacement is necessary.

This kind of a production story is fairly typical of those who use Continental products and methods. When it takes place on your production line, it can mean more money in your own pocket and worth-while savings for your company all along the line.

Call Continental when you have an unusual screw fastening problem and see what you can save . . . in money . . . manpower . . . methods or materials. Continental Screw Company, New Bedford, Mass.

—You can count on Continental

BUSINESS PULSE

(*Continued from page* 116)

Some concern has recently been expressed over the inflationary potential of the wage increases granted to coal miners. It remains to be seen, however, whether the wage boosts will be passed along in the form of higher coal prices or whether the higher costs will be absorbed by mine operators. In view of indications of softness in some coal markets, many analysts believe that at least part of the increase will be absorbed in order to prevent shifts by coal users to other fuels.

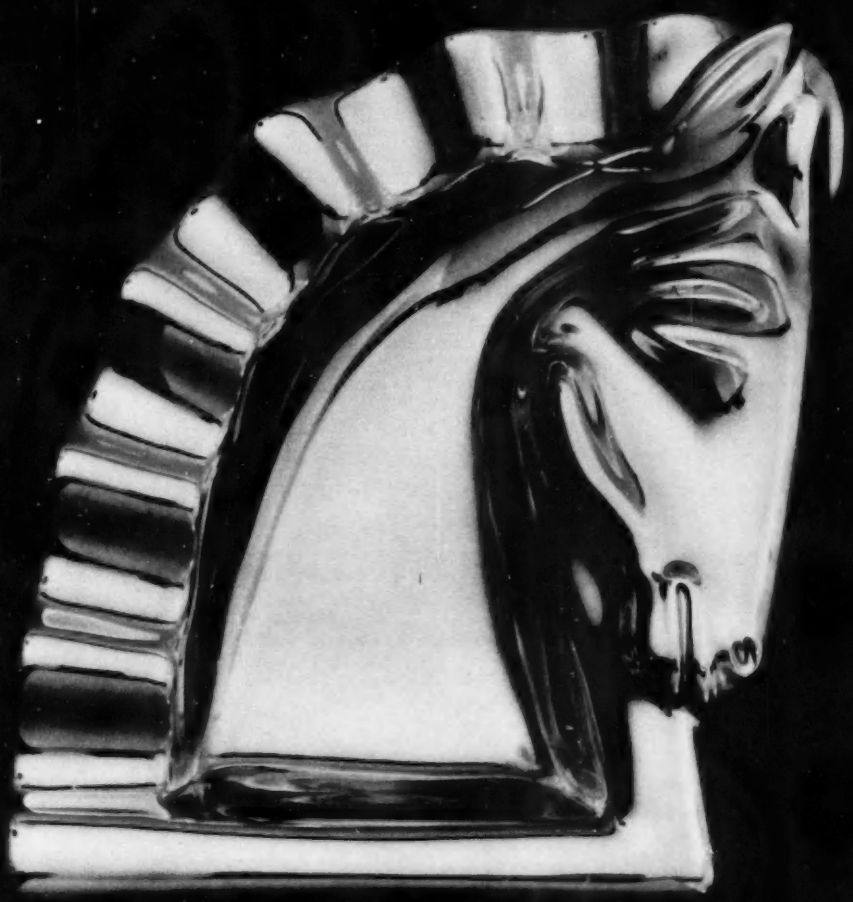
The outlook for continued high levels of business activity has strong supports, at least for the immediate future. Personal income in July, the latest month for which data are available, although moderately below June levels because of the steel strike, remained at the high annual rate of $264 billion. This high level, coupled with indications of a declining tendency in the propensity to save, augurs well for retail trade.

Large Capital Investments

The current position of unfilled orders on the books of manufacturers also suggests a sustained level of activity for some time to come. At the end of July, unfilled orders for durables were equivalent to seven months of sales at the July rate, an exceptionally favorable relationship. A substantial increase occurred in the backlog of consumer-goods orders during July, especially in textiles. Moreover, studies show that American business is planning to spend a record $14.3 billion for capital investment during the second half of 1952, which, if realized, would raise the total for the entire year to $27.5 billion, four per cent higher than in 1951. In the important area of defense spending, indications are that dollar totals will continue to rise moderately for at last several quarters, with a peak being reached sometime during the second half of 1953. Whereas military outlay was running at a quarterly rate of $12¼ billion in July, it is expected to reach about $14 billion by the end of the present fiscal year.

YOUR JOB IS CLEAR —GET IN THE SCRAP to keep steel coming

NON-FERROUS SCRAP *is needed too!*



what happens to your horsepower?

From motor to traction point, the horsepower your automotive vehicle generates must travel through a maze of propulsion units. Spicer has concentrated on the invention, development and perfection of these units for 48 years. Today, the use of Spicer equipment for efficient application of horsepower is standard in almost every type of automotive vehicle. Ten great and modern Spicer plants are efficiently equipped to serve the industry's needs.

Spicer

SPECIALISTS IN SERVICE

Standard equipment for over 40 years in many of America's leading automotive vehicles

• This Spicer Salisbury Axle for passenger car and light commercial use is engineered for long, quiet life. It offers these special features:

RIGIDITY—The special Spicer design and construction maintain accurate alignment of gears and bearings under all speeds and loads, assuring continued quiet operation.

LUBRICATION—Scientifically developed control of oil circulation provides a constant, correctly proportioned flow to all gears and bearings for effective lubrication and cooling.

RUGGEDNESS—Sturdily constructed to withstand the high speeds and extremes of punishment which are common in modern automotive vehicle operation.

ACCESSIBILITY—Extremely easy to get into for inspection of parts. Simple-to-remove gear cover, oil level and drain plugs reduce service time and costs.

SPICER MANUFACTURING
Division of Dana Corporation • **TOLEDO 1, OHIO**

Spicer
Salisbury
AXLES

TRANSMISSIONS • UNIVERSAL JOINTS • BROWN-LIPE AND AUBURN CLUTCHES • FORGINGS • PASSENGER CAR AXLES • STAMPINGS • SPICER "BROWN-LIPE" GEAR BOXES • PARISH FRAMES • TORQUE CONVERTERS • POWER TAKE-OFFS • POWER TAKE-OFF JOINTS • RAIL CAR DRIVES • RAILWAY GENERATOR DRIVES

New GM Intercity Bus

(*Continued from page* 47)

to settle toward the axles, the leveling valves automatically meter more air into the system, increasing the air pressure to compensate for the added weight. This keeps the coach body at its original level.

As the coach is unloaded, the leveling valves release air from the system, decreasing the pressure and again keeping the coach body at the same level. However, the leveling valves do not respond to rapid relative motions such as those caused by road irregularities.

Each of the four air chambers consists of a rectangular, rubber lined, sheet-steel box with large openings into two rubberized nylon tire fabric bellows mounted below it, forming a single compartment of compressed air. The air bellows serve as a flexible connection between the body and the axles. Flexing of the air bellows results in alternate increase and decrease in the air volume and resultant pressure within the air chamber. This acts to absorb road shock.

Direct, double-acting shock absorbers are used at both sides of front and rear axles to control rebound and to further cushion the ride.

Axles are maintained in position against lateral, longitudinal, and torsional movement by the radius rods. These rods are rubber mounted and require no lubrication.

A GM six-cyl, two-stroke Diesel of 426 cu in. piston displacement powers the new bus. The engine develops 200 bhp at 2000 rpm, and has a maximum torque of 600 lb-ft at 1200 rpm.

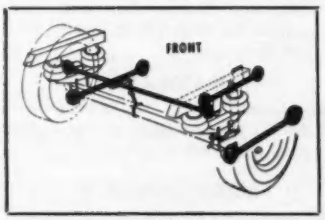
A Bendix-Westinghouse, two cylinder air compressor delivers 12 cfm. The three cylindrical air tanks have a capacity of 3600 cu in.

Body side panels and window panels are aluminum, riveted to steel upper and aluminum lower posts. Lower body panels around the entire coach feature integral fluted siding with exposed rivets. Upper body and roof panels are made of painted sheet aluminum with fluted trim applied between windows of the bus.

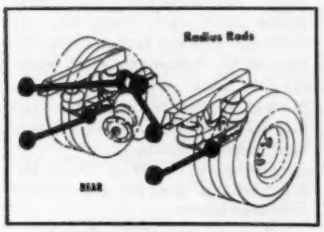
Accomodations are for 41 passengers in 18 double reclining seats (nine on each side) and in a five-passenger non-reclining rear lounge seat.

Overall length of the bus is 35 ft, wheelbase 261 in., width over rear tires 95⅝ in. and turning radius is 36 ft.

Heated or cooled air is circulated to all areas in the coach through a common duct system. Normal air circulation is 1650 cfm for summer operation and 1200 cfm for winter conditions.



Front radius rods. All radius rods are rubber mounted.



Arrangement of rear radius rods.

ASSURED DEPENDABILITY

Lamb Electric

SPECIAL APPLICATION
FRACTIONAL HORSEPOWER
MOTORS

• The satisfactory experience of users of many thousand types of products equipped with Lamb Electric Motors has proved the importance of designing the motor for the particular application.

By providing the exact mechanical and electrical requirements, *special engineering* assures dependability and other motor qualities essential for outstanding *product* performance.

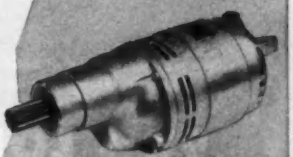
Other advantages usually obtained with Lamb Electric specially engineered motors are — savings in space, weight and cost factor.

The time to realize the full benefits of a Lamb Electric Motor is while your product is in the design stage.

The Lamb Electric Company
Kent, Ohio

In Canada: Lamb Electric–Division of Sangamo Company Ltd.–Leaside, Ontario

Compactly designed motor developed for metering pump and special instrument service.



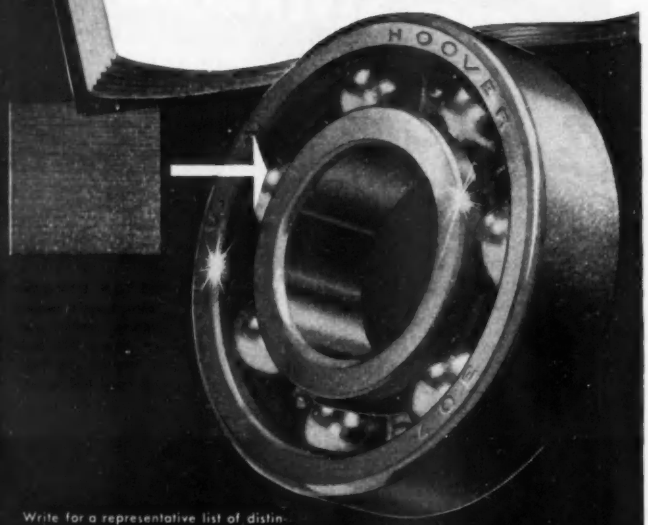
Geared head motor with low output shaft speed for many slow speed heavy-duty drives.

THEY'RE POWERING
AMERICA'S *Finest* PRODUCTS

Lamb Electric
SPECIAL APPLICATION
FRACTIONAL HORSEPOWER MOTORS

HOOVER HONED RACEWAY

The Distinguished User list of **HOOVER,** *America's only* **BALL BEARING** *with Honed Raceways reads like a* **"WHO'S WHO** *of American Industry"**



Write for a representative list of distinguished users of Hoover Ball Bearings.

90% LONGER LIFE
30% GREATER LOAD
AMAZING QUIETNESS

The Aristocrat of Bearings

HOOVER BALL AND BEARING CO.
ANN ARBOR, MICHIGAN

RADIOISOTOPE PROJECTS

(*Continued from page* 53)

ated piston rings the amount of wear during the running of an automotive engine and develop lubricants to reduce this wear.

Southern Pacific Co., San Francisco—Radiographic inspection of castings and parts from locomotives and cars.

Westinghouse Electric Corp., Sunnyvale—Industrial radiography.

CONNECTICUT

Hartford Electric Steel Corp., Hartford—Radiographic inspection of steel castings.

Niles-Bement-Pond Co., Pratt & Whitney Div., West Hartford—Use as source in beta-ray thickness gage.

DELAWARE

E. I. du Pont de Nemours & Co., Wilmington—Determine mechanism of surface treatment of metals.

ILLINOIS

Gunite Foundries Corp., Rockford—Radiographic inspection of castings.

INDIANA

P. R. Mallory & Co., Inc., Indianapolis—Study transfer and erosion of materials in electrical contacts.

U. S. Rubber Co., Mishawaka—Thickness gage for measuring rubber and plastic sheet.

IOWA

Armstrong Rubber Manufacturing Co., Des Moines—Beta gage for measuring thickness of rubber material.

MARYLAND

Bethlehem Steel Co., Baltimore—Source for beta gage to gage strip steel and metallic coatings.

MASSACHUSETTS

Massachusetts Institute of Technology, Cambridge—Irradiated Fe, Cr, Mn steel alloy cylinders, cast iron piston rings, and chromium and copper plated steel studs. Study dry and lubricated friction phenomena to determine the role of material transfer by using radioactive tracers. Method applied to laboratory friction machine, to automobile engines, and to metal cutting.

General Electric Co., West Lynn—Development of aircraft gas turbine instrumentation.

(*Turn to page* 124, *please*)

When a high-strength steel is needed

for severe cold-formed shapes like these bumpers

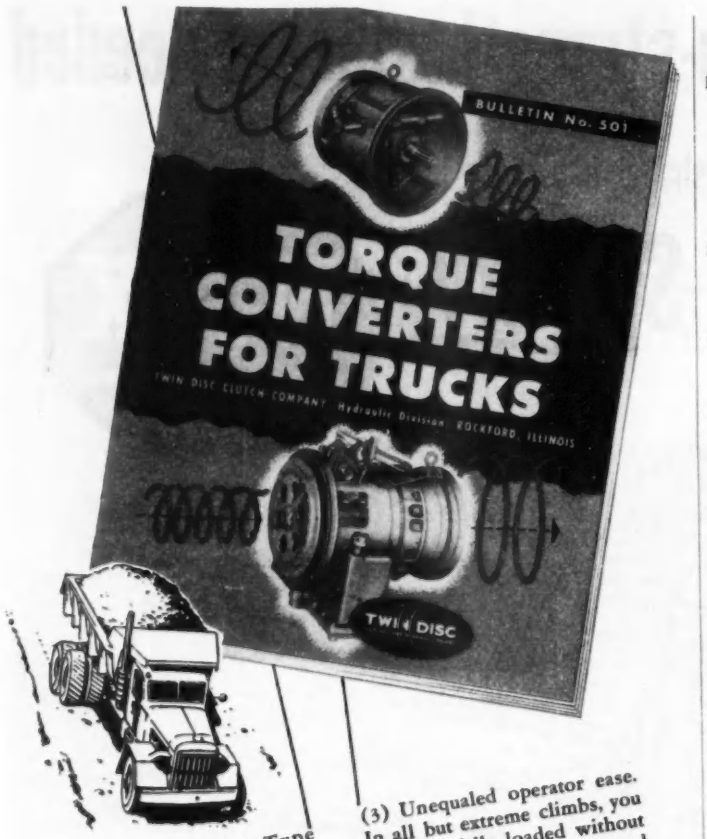
Specify→ N-A-X HIGH-TENSILE STEEL

and get all of the requirements of SAE 950

When a material meeting the requirements of the high-strength, corrosion-resisting steels of SAE Specification 950 is used for severe cold-formed shapes, it will pay to investigate N-A-X HIGH-TENSILE steel—the low alloy steel with *built-in formability*. Its finer grain and higher hardness also result in brighter luster when ground and polished for plated parts.

GREAT LAKES STEEL CORPORATION
N-A-X Alloy Division
Ecorse, Detroit 29, Mich.

NATIONAL STEEL CORPORATION


BULLETIN No. 501
TORQUE CONVERTERS FOR TRUCKS
TWIN DISC CLUTCH COMPANY Hydraulic Division ROCKFORD, ILLINOIS
TWIN DISC

Twin Disc Truck-Type Torque Converters are helping set new standards for operator ease, trip time and low maintenance in open pit mining. In mine after mine where loads are big and hauls steep, trucks equipped with Twin Disc's Converters have increased operating efficiency, cut hauling costs through triple advantages. Only Twin Disc Truck-Type Hydraulic Torque Converters provide these exclusive advantages: (1) Highest (up to 6-to-1) torque multiplication, (2) Torque Converter braking, (3) Unequaled operator ease. In all but extreme climbs, you come up fully loaded without gear shifting, and descend empty without using the brake pedal!

Write for newest Truck-Type Torque Converter Bulletin (No. 501) to see which of Twin Disc's two converters—Model CF for short, steep hauls or Model DF (with direct drive) for longer hauls with intermittent climbing and descending—fits your requirements. Or contact your nearest Twin Disc Factory Branch.

Built for a Long Life . . .
Backed for a Lifetime

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois

BRANCHES: CLEVELAND • DALLAS • DETROIT • LOS ANGELES • NEWARK • NEW ORLEANS • SEATTLE • TULSA

(*Continued from page* 122)

MICHIGAN

Ford Motor Co., Dearborn—Measure height of metal in cupolas; measure thickness of cold rolled stock and continuous strip steel; radiograph for castings and welds; study distribution of sulfur in steel; study oil consumption in internal combustion engines.

Bendix Aviation Corp., Detroit—Test and calibrate experimental equipment; investigate high-altitude pressure measurements.

Chrysler Corp., Detroit—Study wear and rate of wear of contacts.

MINNESOTA

Minneapolis-Moline Co., Minneapolis—Radiographic inspection of castings, forgings and weldings.

NEW JERSEY

Copper Alloy Foundry Co., Hillside—Radiograph rough machined jet aircraft support rings.

American Brake Shoe Co., Mahwah—Radiography of cast iron and steel castings and use in thickness gage.

Wright Aeronautical Corp., Wood Ridge—Radiographic inspection of cast and welded aircraft engine parts.

NEW YORK

General Electric Co., Schenectady—Study the mechanical behavior of carbon brush wear during commutation of a d-c motor and the reason for the production of radio noises in these machines.

Line Air Products Co., Tonawanda—Radiographic inspection of welds, castings, etc.

OHIO

The B. F. Goodrich Co., Akron and Brecksville—Measure tread wear as a function of vehicle velocity, road surface, road temperature, etc.

Cincinnati Milling Machine Co., Cincinnati—Study wear of cutting tools.

Case Institute of Technology, Cleveland—Evaluation of detergents in lubricating oils.

PENNSYLVANIA

Atlantic Refining Co., Philadelphia—Investigate lubricating properties of various engine oils, and effects of fuel quality and operating conditions on engine wear.

Gulf Research and Development Co., Pittsburgh—Determine rates of settling of additives in oil and estimate particle size distribution of agglomerates.

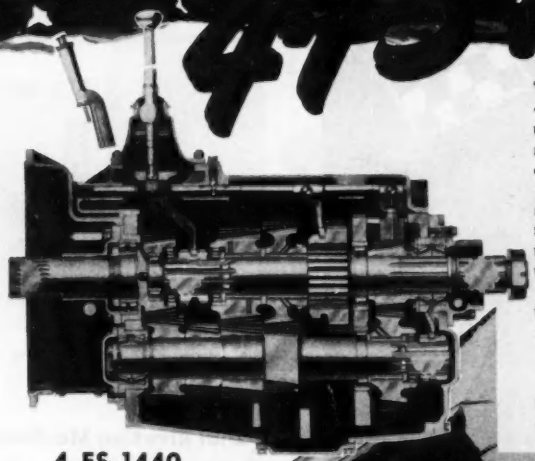
(*Turn to page* 126, *please*)

Now—Get the Advantages of Torque Converters on Your Biggest Trucks—with Fuller 4-FS-1440

In keeping with its tradition of setting the pace with "The Best for the Biggest," Fuller announces its new 4-FS-1440 Transmission with closely spaced ratios for use with truck-type torque converters. This new unit makes new load-and-road performance possible in heavy duty service.

Built to deliver the power from the biggest automotive diesel engines now available plus ample capacity for high torque multiplication from the most advanced torque converters, the new 4-FS-1440 puts up to 400 hp. to work efficiently and dependably.

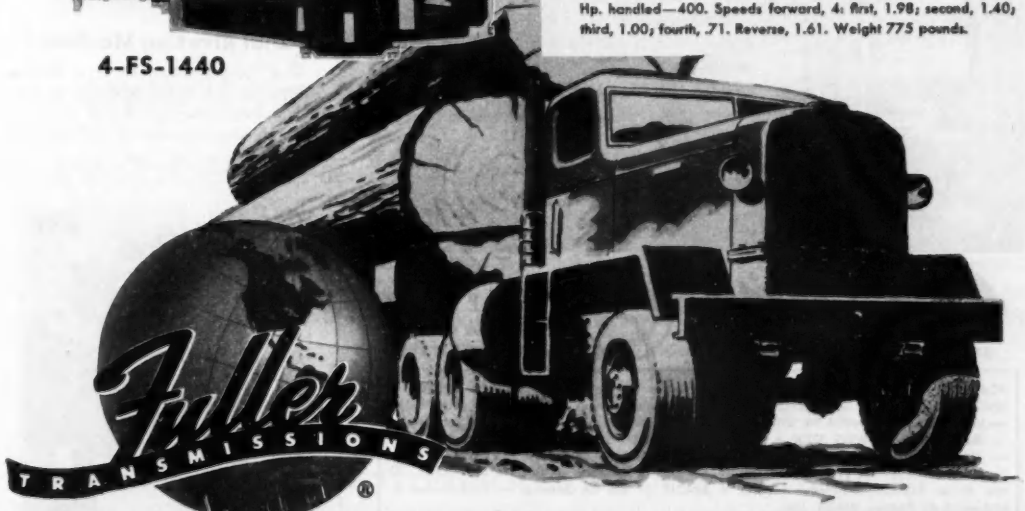
For maximum service plus maximum versatility in the toughest of heavy hauling, investigate the new 4-FS-1440. Write for performance and application data.



4-FS-1440

VITAL STATISTICS

Hp. handled—400. Speeds forward, 4: first, 1.98; second, 1.40; third, 1.00; fourth, .71. Reverse, 1.61. Weight 775 pounds.



FULLER MANUFACTURING COMPANY (Transmission Division), KALAMAZOO 13F, MICHIGAN

Unit Drop Forge Division, Milwaukee 1, Wis. • WESTERN DISTRICT OFFICE (SALES & SERVICE—BOTH DIVISIONS), 1060 E. 11th Street, Oakland 6, Calif.

(*Continued from page* 124)

Mellon Institute of Industrial Research, Pittsburgh — Study mechanism of the Fischer-Tropsch reaction by which hydrogen and carbon monoxide are reacted over metal carbides to form hydrocarbons.

TENNESSEE

Fairchild Engine and Airplane Corp., Oak Ridge—Radiography of metal and ceramic materials.

WISCONSIN

A. O. Smith Corp., Milwaukee—Radiographic inspection of welded seams.

What's NEW AT THE NATIONAL METAL SHOW October 20 to 24 PHILADELPHIA Pa.

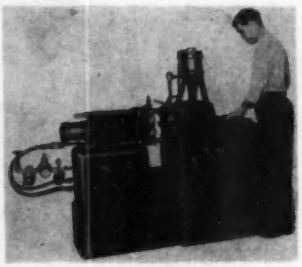
For additional information, please use postage-free reply card on page 65

(*Continued from page* 60)

Die Casting Machine

Recently brought out is the Model 1000, one lb zinc die casting machine with its increased toggle locking pressure, greater melting capacity and its new safety shot coupling. This machine has die blocks two in. thick with an allowable increase in die thickness up to three in. for each half. The machine is equipped with a 250 lb pot and is capable of a free cycling speed in excess of 100 shots per hour. *ABC Die Casting Machine Co., Booth 1563.*

Circle MS-17 on page 65 for more data



ABC Model 1000 zinc die casting machine.

Dial Riveting Machine

Dial fixture automatic rivet setting equipment has been designed to provide greater speed of tubular rivetting through simplification of loading and

(*Turn to page* 128, *please*)

Chicago Rivet & Machine rivet setter, Model 4012.

Roto-Finish COMPANY

associated with The Sturgis Products Co.
3713 MILHAM ROAD, KALAMAZOO, MICH.

P. O. Box 988—
Phone 3-5578

FOREIGN REPRESENTATIVES: CANADA — Windsor — Roto-Finish Canada Limited • ENGLAND — London — Roto-Finish Limited — 39 Park Street — Mayfair • AUSTRALIA — Melbourne — A. Flavell Pty, Ltd. • HOLLAND — Delft — N. V. Roto-Finish Maatschappij — Rotterdamse — WEG 370A • AUSTRIA, GERMANY, SWITZERLAND — Frankfurt a.M. — Metallgesellschaft A.G., Germany • ITALY — Milan — Societa Roto-Finish a R.L. — Sesto S. Giovanni — Viale E. Morelli 31 • FRANCE — Paris — Societe Roto-Finish, 70 rue de la Republique-Puteaux (Seine) • BRAZIL — Rio de Janeiro — Commercial E. Industrial de Formos Werco, Ltds.

500 Million Eaton Self-Locking Screws!

Now—New designs for modern high-speed engines

Since Eaton pioneered the development of the self-locking screw in 1936, we have furnished approximately 500 million self-locking tappet screws to the automobile, truck, and tractor industries for use in all types of engines. In cooperation with leading engine manufacturers, Eaton has developed new and improved types of self-locking screws for use in the latest high-speed, overhead valve engines.

You can utilize Eaton's long experience in this field by giving our engineers an opportunity to work with yours in the early stages of design.

EATON MANUFACTURING COMPANY

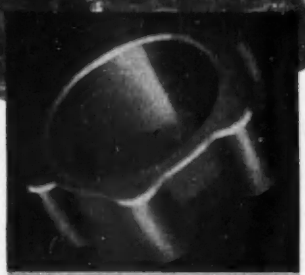
CLEVELAND, OHIO

SAGINAW DIVISION: 9771 FRENCH ROAD • DETROIT 13, MICHIGAN

PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

FORGINGS BY KROPP

Photo: Acme Photo



THIS FORGING FIGHTS IN KOREA

A U. S. medium tank pulls up alongside a Russian built T-34 which it has just knocked out during the fighting around Pyongyang. Tank parts must be rugged and able to take any abuse . . . that's why forgings are used. Kropp is supplying many parts for the tank program, one of which is shown here . . . quality forgings for strength and durability. For your forging needs . . . contact Kropp . . . "America's Number One Forge Company".

WHERE *Better* FORGINGS ARE MADE

KROPP FORGE COMPANY
5301 W. ROOSEVELT ROAD
CHICAGO 50, ILLINOIS

Subsidiaries:
KROPP STEEL CO., ROCKFORD, ILL.
KROPP FORGE ORDNANCE CO.
MELVINDALE, MICH.

What's New at the

● National Metal Show ●

For additional information please use postage-free reply card on page 65

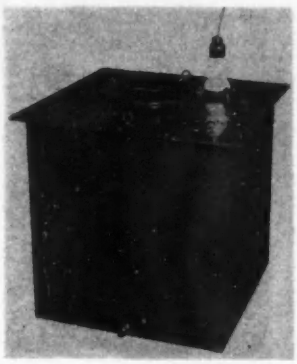
(*Continued from page* 126)

control of operator speed. Combining a 40 in. diam rotating dial fixture equipped with 12 fixture stations, this Model 4012 feeds and clinches three tubular rivets simultaneously through the one single setting and two double setting automatic rivet setters. The elements are of standard design, though the combination is built to order to suit the particular item being rivetted.

The dial fixture is driven by a Geneva gear type mechanism actuated through a Graham transmission that permits control of rotation rate from zero to 35 stations per minute. Stations are positioned with a positive stop and rivetting machines are tripped by solenoids. *Chicago Rivet & Machine Co., Booth 1819.*

Circle MS-18 on page 65 for more data

High Potential Power Supply

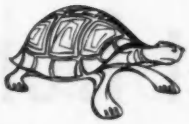


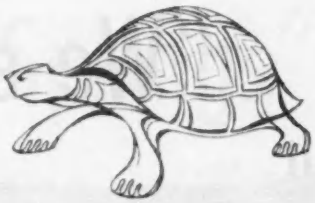
Scientific Electric 140 kvp high potential power supply.

Recently announced are remote controlled ionic high potential power supplies which may be used for various commercial applications. These supplies may be used for paint spraying, usually voltages above 100 kvp are used for this application.

Units ranging from one to 160 kvp are considered standard. Units above 160 kvp are custom built. Cur-

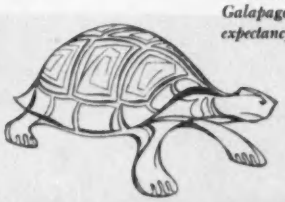
(*Turn to page* 132, *please*)





• *Unmatched for long, peak service life at the clutch position is the Aetna T-Type Clutch Release Bearing . . . life expectancy: Far in excess of average vehicle life.*

• *Unmatched for long life amongst all living creatures are the giant turtles inhabiting the waters of the Galapagos Islands . . . life expectancy: 300 to 400 years.*



1st in long life expectancy

For long life, for performance, for trouble-free dependability—the unique combination of advantages possessed by the Aetna T Type Bearing challenge comparison with any other bearing suited to the clutch release position.

Right now Aetna is vigilantly alive to its responsibilities as the No. 1 supplier of this essential bearing to the Nation's vital civilian and military vehicle builders. It will continue to direct the results of its best thinking, best experience and best craftsmanship toward further improvements in its service to these indispensable industries.

Standard and Special Ball Thrust Bearings • Angular Contact Ball Bearings • Special Roller Bearings • Ball Retainers • Hardened and Ground Washers • Sleeves • Bushings

AETNA BALL AND ROLLER BEARING COMPANY
4600 Schubert Avenue • Chicago 39, Illinois

In Detroit — Sam T. Keller — 2457 Woodward Avenue

"We expect a lot from

Here, springs and cups are made up into complete spring assemblies . . .

Then the springs are fastened to the bottom of the shipping crate . . .

And the typewriter base is secured to the shipping crate bottom . . .

Then the entire unit is crated. Springs are the only cushioning used.

these American Springs"

says UNDERWOOD CORPORATION, world famous typewriter manufacturer

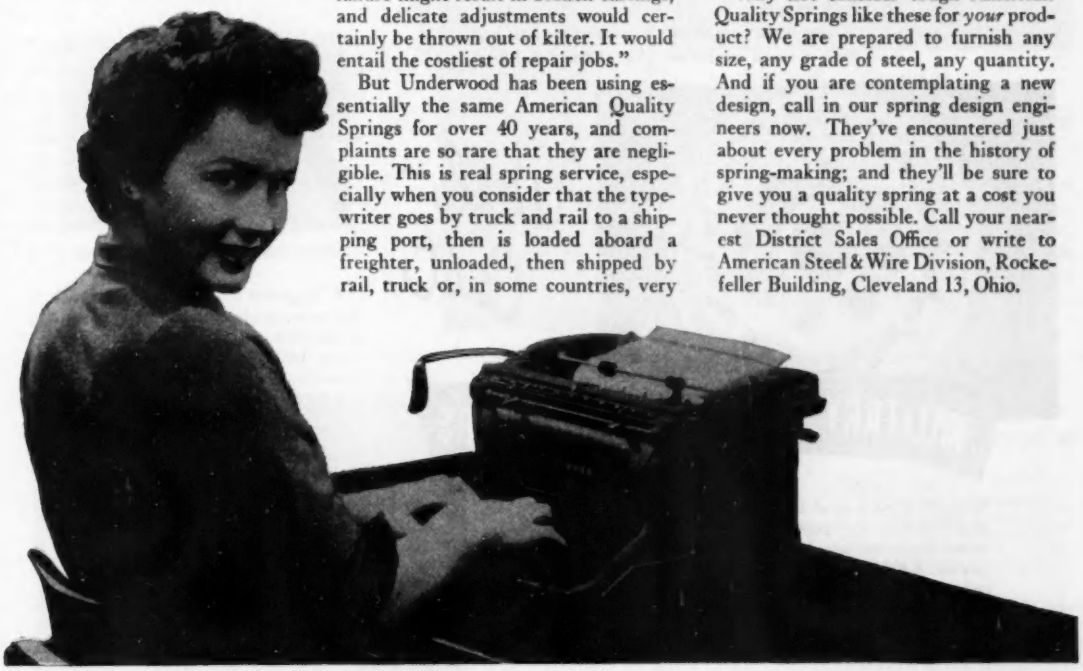
UNDERWOOD is so quality-conscious that they use a spring-cushioned packing crate for every typewriter shipped out of the country.

"These cushion springs have to be good," says Underwood, "because we use no other protective cushioning. Spring failure might result in broken castings, and delicate adjustments would certainly be thrown out of kilter. It would entail the costliest of repair jobs."

But Underwood has been using essentially the same American Quality Springs for over 40 years, and complaints are so rare that they are negligible. This is real spring service, especially when you consider that the typewriter goes by truck and rail to a shipping port, then is loaded aboard a freighter, unloaded, then shipped by rail, truck or, in some countries, very frequently *donkey cart* to some interior town.

As Underwood puts it, "The cushion springs must absorb unbelievably rough handling, jostling and drops. But we have a good reputation for damage-free arrivals."

Why not consider tough American Quality Springs like these for *your* product? We are prepared to furnish any size, any grade of steel, any quantity. And if you are contemplating a new design, call in our spring design engineers now. They've encountered just about every problem in the history of spring-making; and they'll be sure to give you a quality spring at a cost you never thought possible. Call your nearest District Sales Office or write to American Steel & Wire Division, Rockefeller Building, Cleveland 13, Ohio.



AMERICAN STEEL & WIRE DIVISION, UNITED STATES STEEL COMPANY, GENERAL OFFICES: CLEVELAND, OHIO
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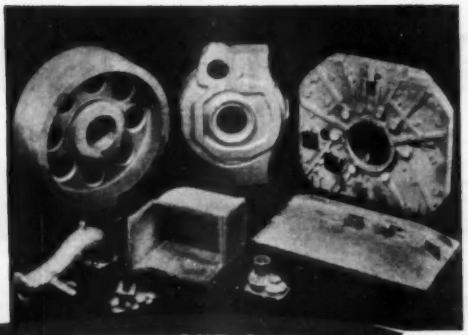
U·S·S American Quality Springs

UNITED STATES STEEL

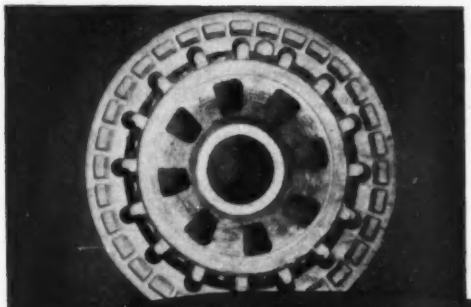
*Well-Cast



COMMERCIAL LIGHTWEIGHT CASTINGS

Your commercial requirements for lightweight castings in aluminum or magnesium may be tough, but we'd welcome an opportunity to look them over. We've tackled a good many diversified casting problems over almost a half century.

Our four completely equipped plants and their trained personnel are at your disposal.



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MILITARY LIGHTWEIGHT CASTINGS

Aircraft wheels, strut parts, engine parts and miscellaneous components are being made every day at our plants, in aluminum and magnesium. X-Ray inspection, close attention to detail, complete facilities for production in sand, semi-permanent and permanent mold form.

Well-Made Wood and Metal Patterns.
Well-Cast Ampco Bronze Castings.

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DEPT. 3, 12800 SHAKER BLVD., CLEVELAND 20, OHIO

What's New at the

● National Metal Show ●

For additional information please use postage-free reply card on page 65

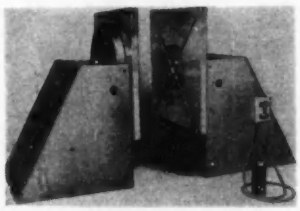
(*Continued from page* 128)

rent is usually selected by customers requirements. Units available are either mobile or stationary. Power input is 110, 220, 440, or 550 v. *Scientific Electric, Booth 1227.*

Circle MS-19 on page 65 for more data

Positioner

Model HTS12 head and tail stock positioner, that has recently been designed, will be on exhibit. The positioner was designed particularly for heavy duty applications. It has a magnetic brake motor and a table rotation of 1.13 rpm constant speed.



Aronson head and tail stock positioner.

A magnetic reversing starter with the motor enclosed within the chassis is provided. The unit has a cam yoke roller table back-up. *Aronson Machine Co., Booth 718.*

Circle MS-20 on page 65 for more data

Mirror Polisher

On display is a mirror finishing machine built to function as a double-sided polishing machine. Its primary application in manufacturing is where relatively rough ground surfaces are polished to mirror-finish both sides simultaneously in a minimum time without disturbing the heat-treat existing in the work.

Buffing arbors are capable of holding 20 in. diam buffs to a face width of 36 in. These arbors run on ball bearings in self-aligning housings and are driven through V-belt drives by a pair of variable speed drives.

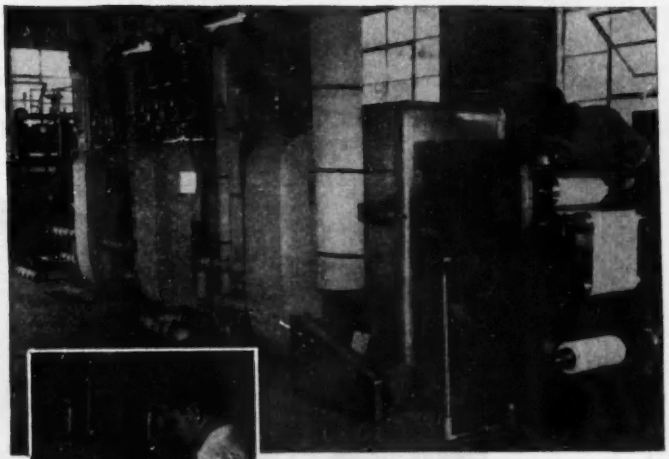
As part of the electrical system, ammeters are mounted on the control panel to show the amount of current drawn by each buff driving motor. Unbalance between these instruments

(*Turn to page* 134, *please*)

Men who design, engineer and buy America's products rely on..and use..National Laminated Plastics because..

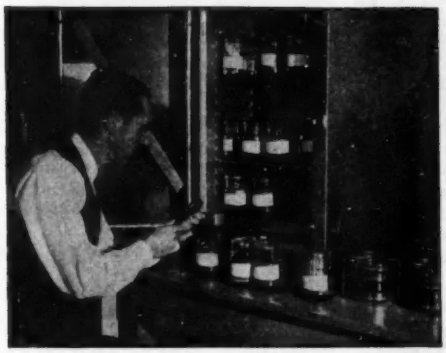
"At National, engineering research is of prime importance. We believe only through it and by large investment in it are we able to: *first*, provide industry with dependable laminated plastics for the efficient production of today's products which were developed yesterday; *second*, give practical assistance to the design engineer who is creating today, new, better products for tomorrow."

J. Warren Marshall, **President**
National Vulcanized Fibre Co.



At the Proving Grounds

Here is the Phenolite Pilot Plant—coating machine and press in miniature—where under exact commercial production conditions, testing and experimental work are conducted on thermo-setting products requiring special resins or base materials. This is representative of the research engineering facilities National provides in which over a million dollars are invested.



Stiegler's Fungus House

Frederick L. Stiegler directed the pioneering research that came up with a fungus-resistant vulcanized fibre, satisfactory for extended exposure to moist, warm air. This new grade of National Vulcanized Fibre has important use in refrigerators and products that must perform in fungus-generating climates.

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NATIONAL VULCANIZED FIBRE

A tough horn-like material with high dielectric and mechanical strength. Excellent machinability and forming qualities, great resistance to wear and abrasion, long life, lightweight. Sheets, Rods, Tubes, Special Shapes.

PHENOLITE Laminated PLASTIC

Phenolite possesses an unusual combination of properties—a good electrical insulator, great mechanical strength, high resistance to moisture; ready machinability, lightweight. Sheets, Rods, Tubes, Special Shapes.

Just published! National Laminated Plastics Handbook. Write for copy. Your company letterhead please.

National Vulcanized Fibre Co.

Wilmington *Offices in* Delaware *Principal Cities*

Since 1873

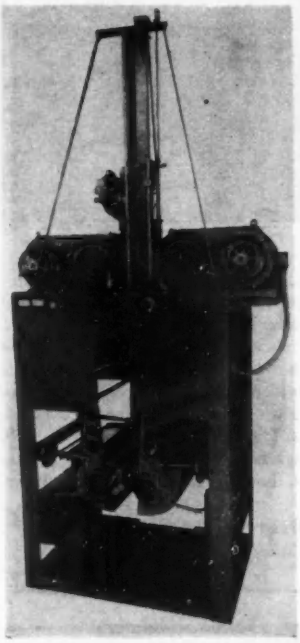
For additional information please use postage-free reply card on page 65

(*Continued from page* 132)

indicates a differential in surface speed.

The machine is built around a heavy structural steel frame with the arbor hangers hung near the top and so arranged that they swing toward or away from each other. Their position with respect to machine center is adjusted simultaneously front and rear through a hand-wheel which permits any degree of pressure to be created between these arbors.

A hydraulic cylinder is mounted top center which operates upwards and downwards carrying the work between the buffing rolls. The rate of travel both upwards and downwards are fully adjustable independently from zero to full speed of about four in. per second. Position of stroke and length of stroke are adjustable with simple convenient strikes.



Nicholas mirror polisher.

The machine is built standard in 18 in. working stroke and has been built special to as long as 36 in. stroke. It is said to be constructed to stand severe abuse and to require little or no maintenance beyond normal oiling and greasing. *Nicholas Equipment Co., Booth 911.*

Circle MS-21 on page 65 for more data

Grinding Machine

Highlighted in this display will be the Diversimatic No. 1-R centerless grinding machine with a capacity of 1½ in. OD. Designed to insure high micro-finishes and close tolerances at fast production speeds, the machine is claimed to be suitable for grinding a large variety of small parts, such

(*Turn to page* 136, *please*)

IN ST
WITH THE NEWEST
in cooling system engineering
DOLE
ACCEPTED BY LEADING AUTO AND TRUCK MANUFACTURERS
CONTROL WITH DOLE
As cooling systems have advanced Dole Thermostat design has moved with them. Smaller radiators, pressurized systems and other such basic changes introduced new factors in thermostat performance. DOLE DV's, with a new operating principle, met that challenge.
In new cars of recent years DOLE DV's assure effective cooling system control. They provide quick warm-up, fast heater output and savings in gasoline, oil and motor wear.
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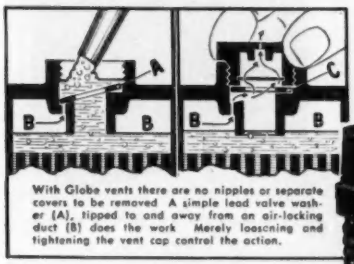
Globe-Union Vents

help make your customers "battery happy"



With Globe vents there are no nipples or separate covers to be removed. A simple lead valve washer (A), tipped to and away from an air-locking duct (B) does the work. Merely loosening and tightening the vent cap control the action.

GLOBE-UNION VENTS give *added* protection for the *extra* power built into Globe batteries. "Stop-spill" water well construction prevents over-filling and dilution of electrolyte solution . . . protects adjacent vehicle parts from acid damage. Proper balance of electrolyte is assured to maintain proper specific gravity and to protect grids from corrosion.

ADVANCED PLATE DESIGN permits use of greater amount of active materials.
FLEXIBLE, rubber-mounted posts absorb shock, prevent battery leakage and snapping of terminals.
HIGH-POROSITY separators permit quick release of power.
PEBBLED SURFACE and *staggered* interlocking grid bars assure longer life.
If it's engineered and made by Globe Union—it's RIGHT FROM THE START

Globe-Union builds quality batteries for original equipment and for mass merchandising under the trade names of GLOBE SPINNING POWER and leading private brands.

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Battery Production Plants At: ATLANTA, GA. • BOSTON, MASS. • CINCINNATI, O. • DALLAS, TEXAS • EMPORIA, KANS. • HASTINGS-ON-HUDSON, N. Y. • LOS ANGELES, CALIF. • MEMPHIS, TENN. • MINERAL RIDGE, O. • OREGON CITY, ORE. • PHILADELPHIA, PA. • REIDSVILLE, N. C.

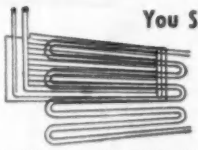
Now Available

STAINLESS STEEL

PLATECOILS

REPLACE PIPE COILS

to SAVE YOU 50% in TANK HEATING and cooling

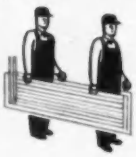


You SAVE 50% in tank SPACE

A 22" x 47" Platecoil gives the same heat transfer surface as 32 ft. of 1½" pipe. This pipe requires a space approximately 30" x 60". Platecoil thus saves about 50% over equivalent pipe coil in space inside your tank.

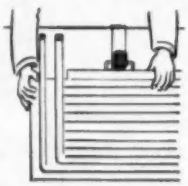
You SAVE up to 50% in initial COST

The initial cost of stainless steel Platecoil is often 50% or more below the cost of equivalent pipe coil. Less time is required to install Platecoil with corresponding saving in installation labor.



You have 50% LESS WEIGHT to handle

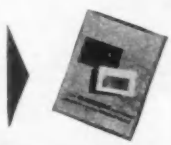
Weighing only about half as much as equivalent pipe coil, Platecoil is easy to handle. A whole maintenance crew is not needed to transport and install it.



You SAVE 50% in maintenance LABOR

The Platecoils can be replaced in a matter of minutes and without emptying the tank. There is no need for workmen to get inside the tank in order to make replacements.

Send for your free copy of the new brochure of Platecoil applications. Write for Bulletin No. P74.



What's New at the

● National Metal Show ●

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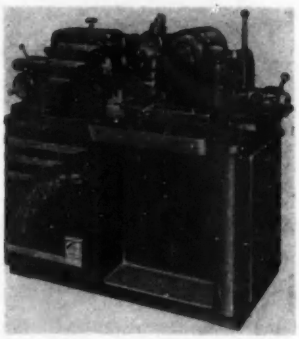
as bearings, bushings, drills, bolts, valves, shafts, etc. It is especially recommended for grinding small aircraft parts.

The manufacturer states that the spindle is a particularly worthy feature of the machine with free-rolling roller and ball bearing construction that is said to eliminate the need for usual warm-up periods. The machine's simple design and small size reportedly make it easy to operate in a minimum of floor space. *Diversified Metal Products Co. Booth 1767.*



Diversimatic No. 1-R grinding machine.

Circle MS-22 on page 65 for more data

Ultrasonic Testing

To be demonstrated are improved models of the ultrasonic Reflectoscope for nondestructive testing. Ultrasonic inspection methods, using the Reflectoscope, can be utilized on many different materials. (Sperry Products, Inc., Booth 1754.)

Circle MS-23 on page 65 for more data

(*Turn to page* 138, *please*)

Ride to greater sales on

Cr-V steel elliptic springs

Heavy-duty truck and bus manufacturers all agree:

Elliptic springs of Cr-V steel contribute a great deal to customer satisfaction, thus to greater sales.

Superior performance has earned this popularity. Elliptic springs of chromium-vanadium steel combine high flexibility, light weight, and low long-run cost with the fatigue strength to give long life under high stresses.

Build this superior combination into *your* heavy-duty automotive equipment—specify Cr-V steel elliptic springs.

And if you have a particularly difficult application problem on the use of alloy steels for heavy-duty springs—or on any other vital automotive components—get in touch with your nearest Vanadium Corporation office. They will be glad to put their experience to work for you.

Call or write today.

MAKERS OF ALLOYS VANCORAM CHEMICALS AND METALS

VANADIUM CORPORATION OF AMERICA

420 LEXINGTON AVENUE, NEW YORK 17, N.Y.

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(Continued from page 136)

Airless Blasting Cabinet

In operation will be a recently developed airless blasting cabinet for cleaning and peening long cylindrical objects, such as torsion bars, etc., and for cleaning such parts as straight axle shafts. It has a skew-dished roll conveyor, for carrying the work through the blast. This type of conveyor rotates the work over and over as it is passed through the cabinet, so the blasts of metallic abrasive thrown from one or more rotating bladed wheels mounted within the cabinet are able to clean the area uniformly. *American Wheelabrator & Equipment Corp., Booth 1749.*

Wheelabrator Wheelapeening Cabinet with skew-dished full conveyor for peening torsion bars.

Circle MS-24 on page 65 for more data

Dependable-every one!
Quality Control does it!
Modern statistical Quality Control procedures hold Tung-Sol Lamps to the highest standards of uniformity To Tung-Sol customers, Quality Control is reflected in performances that exceed specifications and in the virtual elimination of production line rejects. You can count on Tung-Sol quality and Tung-Sol service.
TUNG-SOL ELECTRIC INC.
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TUNG-SOL MAKES:
All-Glass Sealed Beam Lamps, Miniature Lamps, Signal Flashers, Picture-Tubes, Radio, TV and Special Purpose Electron Tubes.
TUNG-SOL®
AUTO LAMPS
Dependable!
TUNG-SOL

Hydraulic Stretcher

A working model of the recently introduced hydraulic stretcher will be displayed. (Sutton Engineering Co., Booth 740.)

Circle MS-25 on page 65 for more data

Electrode Holder

To be exhibited is an electrode holder, Cam-Lok, which is said to help eliminate rod bending and make welding in cramped spaces easier. The Cam-Lok electrode holder is fully insulated with laminated material. The operating mechanism is completely enclosed and protected by the insulation. It is available in three sizes: heavy duty (500 amps), general purpose (300 amps), and light duty (200 amps) (Cam-Lok Div., Empire Products, Inc., Booth 1116.)

Circle MS-26 on page 65 for more data

(Turn to page 140, please)

BJ

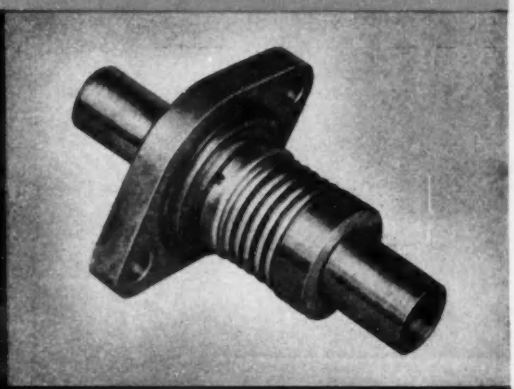
engineered answers to pumping problems

FILE 513

MECHANICAL SEAL

1 PACKING COULDN'T TAKE THIS KILLING COMBINATION OF TOUGH METAL CUTTINGS AND GRINDING WHEEL GRIT...

2 RESULT...THIS IMPORTANT SURFACE GRINDER WAS DOWN EVERY TWO MONTHS FOR COOLANT-PUMP PACKING REPLACEMENT



3 BUT...THIS BJ TYPE L MECHANICAL SEAL SOLVED THE PROBLEM!

4 NOW THIS SAME COOLANT PUMP HAS OPERATED FOR OVER A YEAR AND A HALF WITHOUT ANY LEAKAGE!

FILE FACTS:

- BJ Type L Mechanical Seal replaced packing in pump stuffingbox October 5, 1950, and has operated without any leakage or attention ever since.
- A BJ Bilton pump (1¾" – 1½ H.P. – 50 gpm) used to pump coolant continuously at full capacity 18 hours a day.
- Machine – surface grinder, used for finish grinding of large castings, hard steel bearings and bronze fittings.

For more detailed information on BJ Mechanical Seals, write for Bulletin #53-10000, Byron Jackson Co., Dept.

Byron Jackson Co.

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—a plus value in any product!

Tractors . . . Road Graders . . . Lift Trucks . . . Street Sweepers . . . Road Rollers . . . Power Shovels . . . Trucks and Buses all benefit from Fairfield's 33 years of specialized experience in building complete *differential gear units* for powered vehicles.

If you use DIFFERENTIALS in the product you build, we believe it will pay you as it has others to check with Fairfield on all of your requirements. Fairfield offers (1) Mass Production Economy, (2) Unexcelled Quality, (3) Dependable Service, (4) Expert Engineering Recommendations. YOUR INQUIRY WILL RECEIVE PROMPT ATTENTION.

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For FINE GEARS AND DIFFERENTIALS

What's New at the

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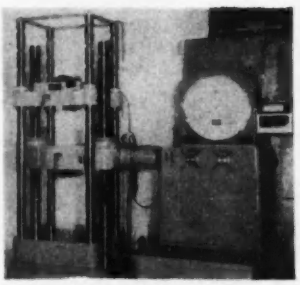
(*Continued from page* 138)

Universal Testing Machine

Highlighted in this year's display will be the Deluxe Model Super L Type hydraulic universal testing machine, available in capacities from 60,000 lb (36 in. plus 9 in. stroke; compression, 36 in.) to 600,000 lb (72 in. plus 12 in. stroke; compression, 72 in.).

Notable features of the Deluxe Model Super L are: loading unit and weighing system independent of each other with no impact or shock transfer possible; 30-in. clearance between screws for easy working with large specimens; four-column construction to provide rigidity for off-center loads and high columns; upper crosshead



Olsen testing machine.

easily positioned to handle various sizes and lengths of test specimens; lower crosshead furnished with separate motorized control with additional controls mounted on crosshead for convenient adjustment; increased stroke length which, added to higher column, provides added length of specimens that can be tested. *Tinius Olsen Testing Machine Co., Booth 1419.*

Circle MS-27 on page 65 for more data

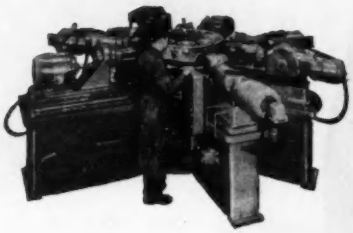
Machine Vises

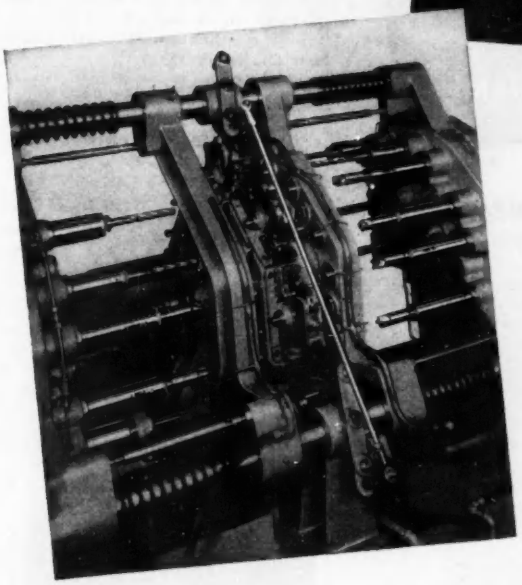
Horizontal swivel and universal vises, said to be very versatile, will be displayed. These vises are claimed to facilitate machining by allowing free access to the work.

A wide variety of settings is available through combinations of interchangeable stepped and solid jaws.

(*Turn to page* 142, *please*)

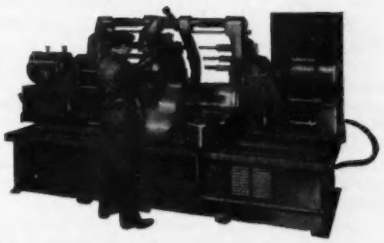
closeups of drilling & tapping PRODUCTION





The Hartford Special machine above is drilling, tapping and chamfering side pad holes in compressor rear frames.

The machine at the left, using a vertical dial, is core drilling, rough and finish reaming, rough and finish facing and chamfering two rockers simultaneously.



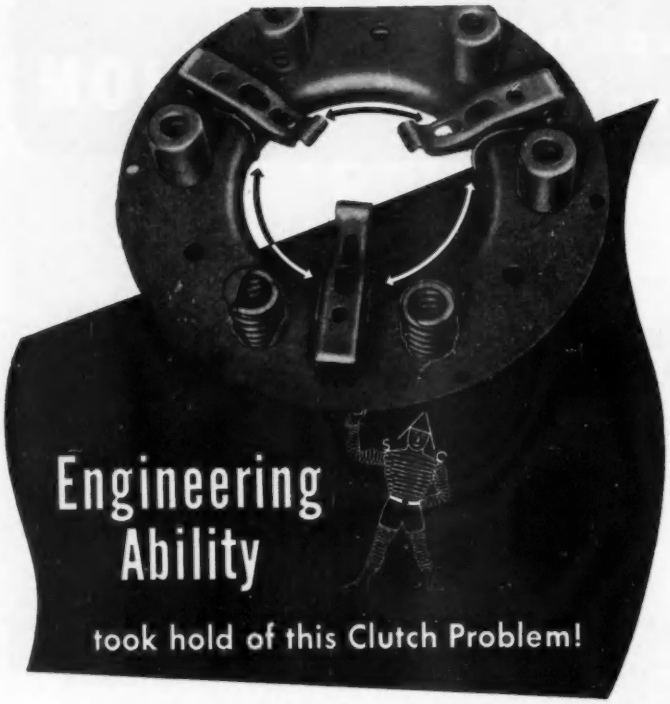
When it comes to production —

HARTFORD *Special*

SUPER-SPACERS

Automatic THREAD ROLLERS

THE HARTFORD SPECIAL MACHINERY CO., HARTFORD 12, CONN.



...with Springs by

AUTOMATIC SPRING COILING COMPANY

This clutch manufacturer was having a problem.

The action of a lever in this particular type of clutch was such . . . that tension had to be applied in quite an unusual manner. And not only was there no standard spring to do the job . . . but also no known machine capable of turning out the necessary custom-built spring!

Then Automatic Spring Coiling Co. was called in . . . and we put *Engineering Ability* to work.

Our consulting engineers analyzed the situation . . . and designed a *special machine* to produce a special *spring* . . . which was also **Shot-peened* for fatigue strength, thereby adding immeasurably to its life potential.

Samples were made and put to repeated and conclusive tests. RESULT: More perfect clutch operation with guaranteed longer life and a considerably lessened chance for shock, slippage, vibration, grabbing and chattering.

Make it a point to consult Automatic Spring Coiling Company early in the job. Take advantage of our . . . ENGINEERING ABILITY . . . gleaned from 30 years of Precision mechanical spring specialization, and by strict adherence to Quality-Controlled standards.

**Incidentally*, "Shot-peened" *springs for added fatigue strength are among our specialties.*

Our veteran consulting engineers are ready to survey your requirements without obligation. Write us today for full details.

AUTOMATIC SPRING COILING CO.
4048 West Thorndale Avenue
CHICAGO 30, ILLINOIS

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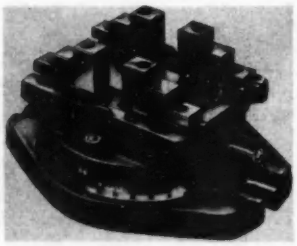
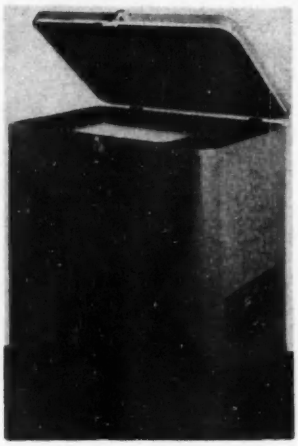


Precision machine vise.

The vises may be equipped with hydraulically-equalized finger jaws, magnetic chuck plate, T-slot plate or three jaw lathe chuck. *Precision Products Co., Booth 1125.*

Circle MS-28 on page 65 for more data

Chilling Machine



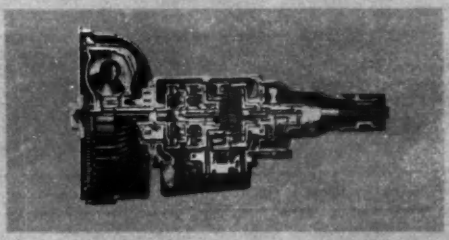
Model V-120-1 is one of two models in a line of low-temperature industrial chilling machines on display. It has a capacity of 1.5 cu ft and maintains temperatures as low as —120 F. (Sub-Zero Products Co., Booth 1320.)

Circle MS-29 on page 65 for more data

Welding Machine

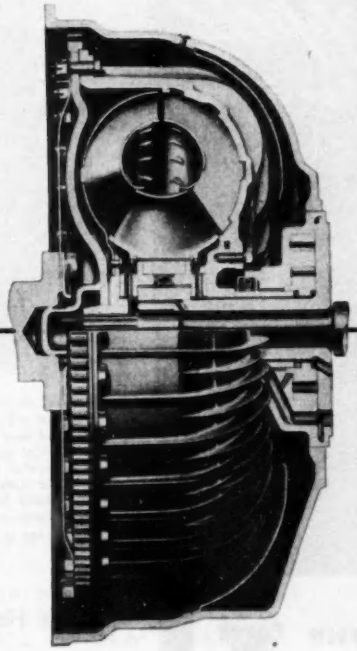
Known as SR-100, an arc welding unit has been developed to weld with unusually low currents on very light

(*Turn to page* 144, *please*)



the new
BORG & BECK TORQUE CONVERTER

used in Fordomatic and Merc-O-Matic transmissions



An air-cooled Torque Converter of unique design with steel blades assembled in die-cast aluminum Impeller whose 68 fins provide swift cooling.

The Turbine is made of steel stampings and the Stator is aluminum. Its One-Way 20 sprag clutch is Borg-Warner's well-proved design.

Light in weight, with a torque ratio of 2.1:1, it has excellent efficiency, yet it can be readily disassembled in the field for inspection or repair.

BORG & BECK CLUTCH · THE STANDARD ·

BORG & BECK DIVISION
BORG - WARNER CORPORATION
Chicago 38, Illinois

BW

For additional information please use postage-free reply card on page 65

(*Continued from page* 142)

gages of stainless steel and other alloy products. It is used extensively with the inert gas shielded arc process but may also be used for normal metallic arc welding. The SR-100 is a selenium rectifier d-c type arc welder having a range from eight amp to 135 amp. This range is available through a low tap having an operating range of eight to 65 amp and a high tap having a range of 35 to 135 amp. The machine is designed to operate on 220/440, three phase, 60 cycle current and can be supplied for 208/220/440 or 220/440/550 primary windings as well.

Standard SR-31, SR-32 and SR-33 panels used in conjunction with the inert gas shielded arc process and incorporating automatic controls for water and gas valves can be used as an accessory to the SR-100 unit. With the SR-33 panel the above described unit can be used on "Heliarc" spot welding applications. *Miller Electric Mfg. Co., Booth 631.*

Circle MS-31 on page 65 for more data

JOHNSON Tappets
are made by Tappet Specialists

Thorough and complete attention by the entire Johnson Tappet organization to these important working parts of your engines assure you of maximum tappet life and performance.

SELF LOCKING TAPPET SCREW
Originated by Johnson this diaphragm type Self Locking Tappet Screw is operating successfully in millions of cast iron and steel tappets.

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MUSKEGON, MICHIGAN

Steel Framing Material

A steel framing material, called Mult-A-Frame, will be shown at the Exposition. Mult-A-Frame consists of three basic units which can be dismantled, adapted, or converted without scrapping to meet new and different uses. It can be used by industry for production, storage and maintenance needs. Ainsworth Mfg. Co.

Circle MS-32 on page 65 for more data

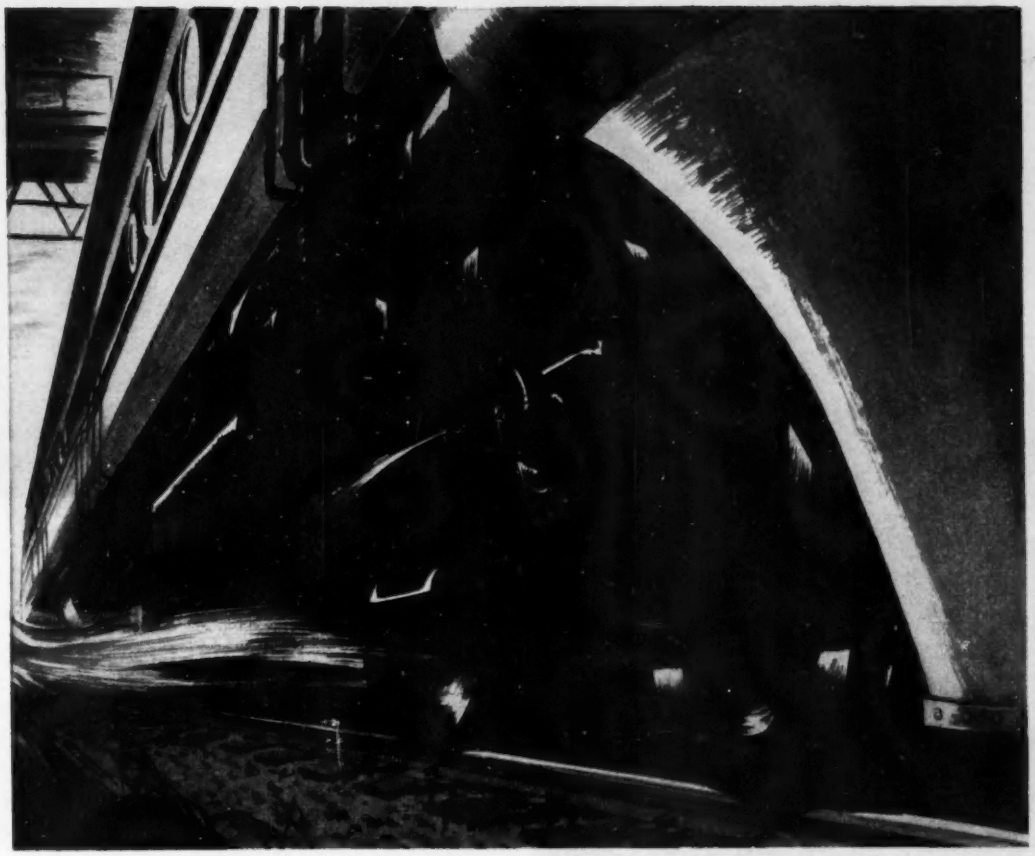
Air Hardening Steel

Now added to a line of precision ground flat stock is a die and flat stock made to a special analysis for hardening in air. It has a five per cent chromium content. For long production runs, it is recommended for punches and dies or for stamping silicon, stainless, Monel and like materials.

The flat stock is claimed to be fully spheroidized annealed for easy machining. It comes ready to lay out and cut out in a range of sizes. *L. S. Starrett Co., Booth 1843.*

Circle MS-33 on page 65 for more data

(*Turn to page* 148, *please*)



Steel veins for iron horses

Steel veins for iron horses—strong, durable veins easily forged and fabricated to exact requirements—this is but one of the many applications for OSTUCO Tubing in products of modern design, products that strengthen America and the free world.

OSTUCO Tubing presents endless opportunities for improving design in almost every field. In addition to infinite adaptability, OSTUCO Tubing offers such advantages as maximum strength with minimum weight, good surface conditions for finishing, excellent machinability, and low cost. We cannot always promise early delivery estimates on new civilian orders, because of military demands, but it will pay you to consult our experienced engineers about OSTUCO Tubing when redesigning your products to meet future competition.

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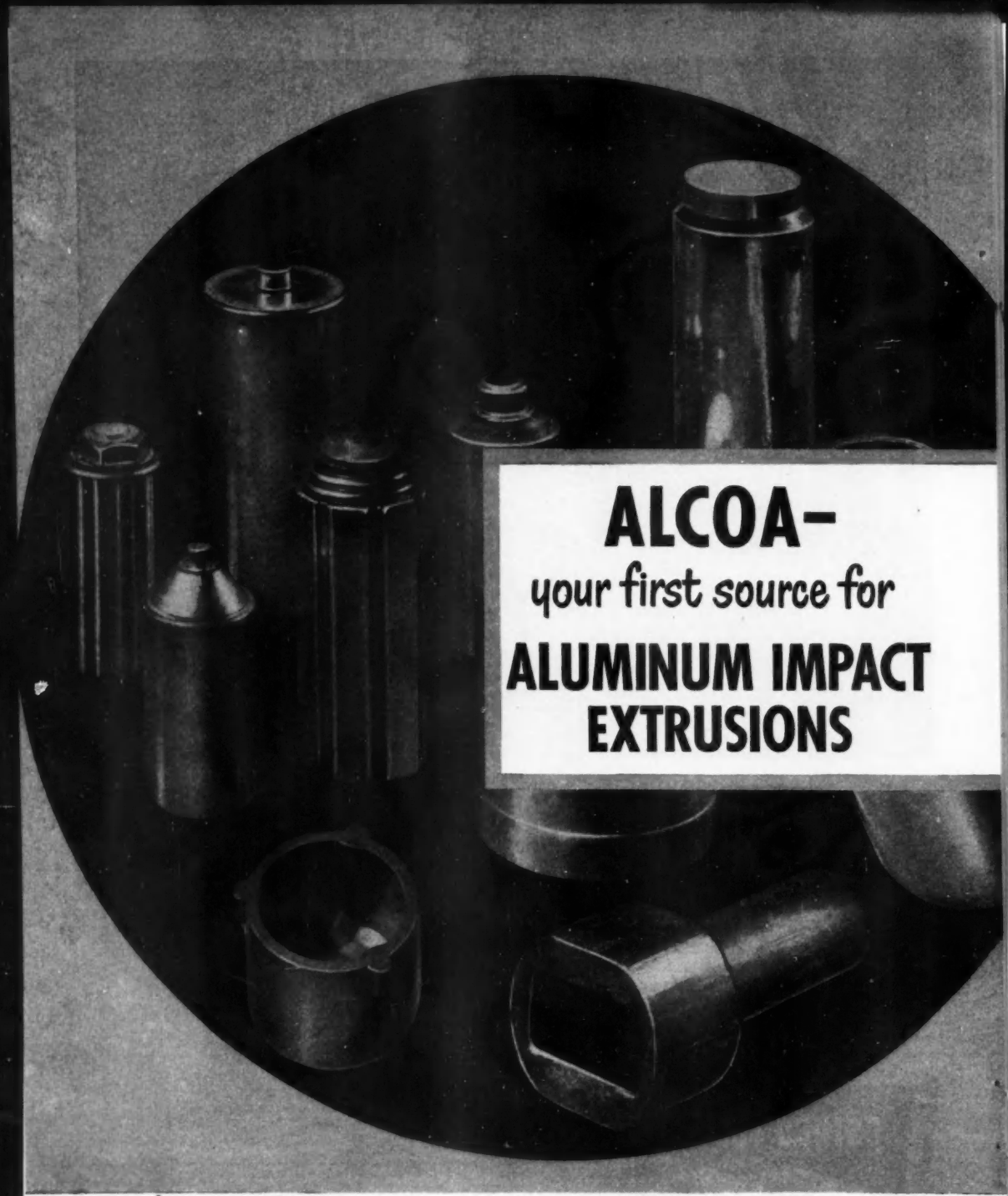

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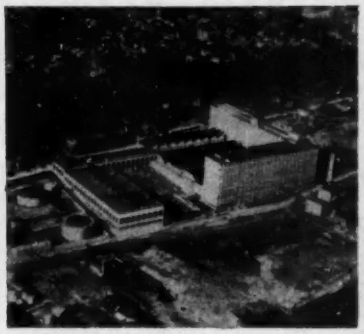
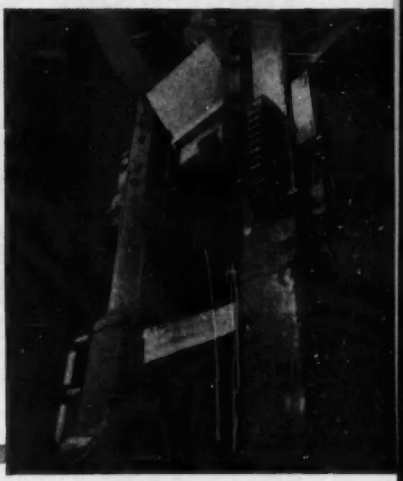
ALUMINUM COMPANY OF AMERICA

Facilities like these mean satisfaction with your source of supply—

HIGH PRODUCTION from Alcoa facilities is typified by this battery of impact-extrusion presses equipped with automatic trimming units.

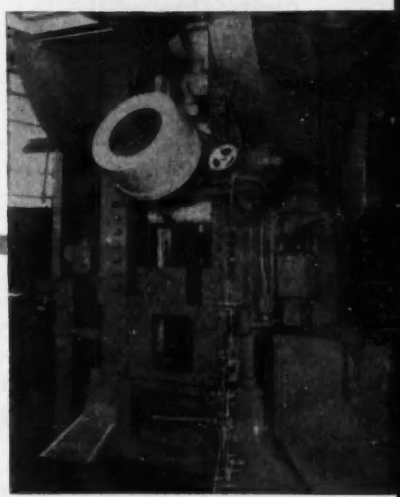


THE ALCOA PLANT, located at Edgewater, New Jersey, indicates the large impact-extruding capacity available at Alcoa. All the services of design consultation, estimating, production and secondary operations are performed here.



PRESSES OF ALL SIZES enable Alcoa to offer you facilities that permit free thinking in your engineering designs.

- Design help backed by technical literature, personal attention of Alcoa sales engineers and the facilities of the world's greatest aluminum research laboratories.
- 30 years' experience in making impact extrusions; 64 years' experience in working with aluminum.
- Ample capacity for large production runs and complete secondary operations such as flanging, flaring, beading and machining.



ALCOA'S NEW PRESSES not only extrude the desired section but trim it automatically as well.

Ask ALCOA first whatever you need in Aluminum

Your local Alcoa sales office is headquarters for "everything" in aluminum. Look for Alcoa under "Aluminum" in your classified phone book.

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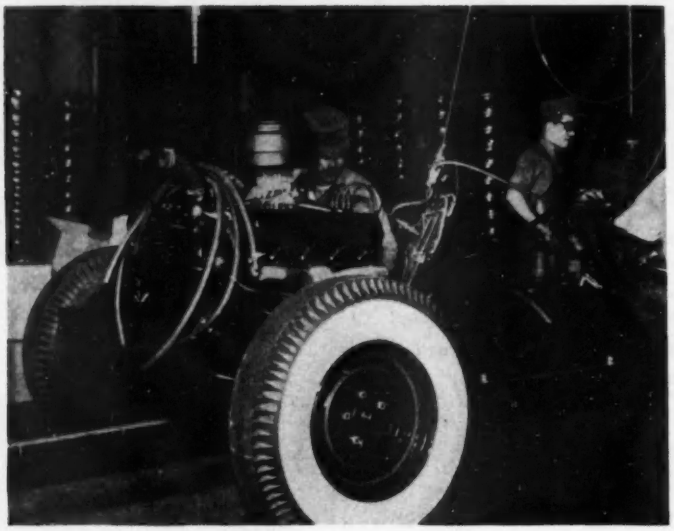
ALCOA
ALUMINUM

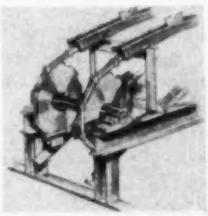
Tailor-Made Conveyor Systems

Increase Your Productivity While Lowering Costs With Webb Conveyors . . . Engineered To Meet Every Conceivable Mechanized Conveying Need.



Chassis Assembly Conveyor with continuous high tee-bars.

Typical of the versatility of Webb Conveying Systems are the chassis assembly conveyors in operation at one of the largest and most mechanized automobile plants in Detroit. For 25 years Webb has materially aided this manufacturer in maintaining production schedules and cost controls with installations such as these chassis assembly conveyors, which permit uninterrupted assembly to the chassis of rear axles, wheels, motor, gas tank and transmission.



Head End Section of Chassis Assembly Conveyor (notched tee-bar type).

Put to better use your Overhead, Floor or Underfloor Space . . . Let Webb Engineers Solve the Challenges Presented by your Most Complicated Materials Handling Problems.

CONVEYOR ENGINEERS AND MANUFACTURERS

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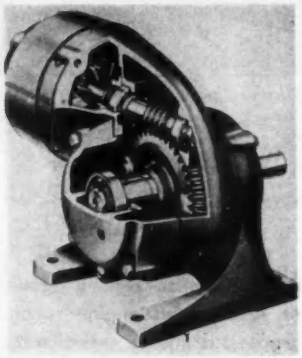
What's New at the

● National Metal Show ●

For additional information please use postage-free reply card on page 65

(*Continued from page* 144)

Right Angle Worm Gear Motor



An electric motor to be displayed, Type GW Syncrogear, is a right angle worm gear model, with cantilever design which is said to permit the motor to assume heavy loads without distorting or misaligning the gears. This motor is said to be made available in sizes from 1/3 to three hp. U. S. Electrical Motors, Booth 760.

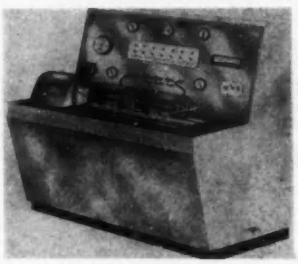
Circle MS-34 on page 65 for more data

"O" Ring Test Unit

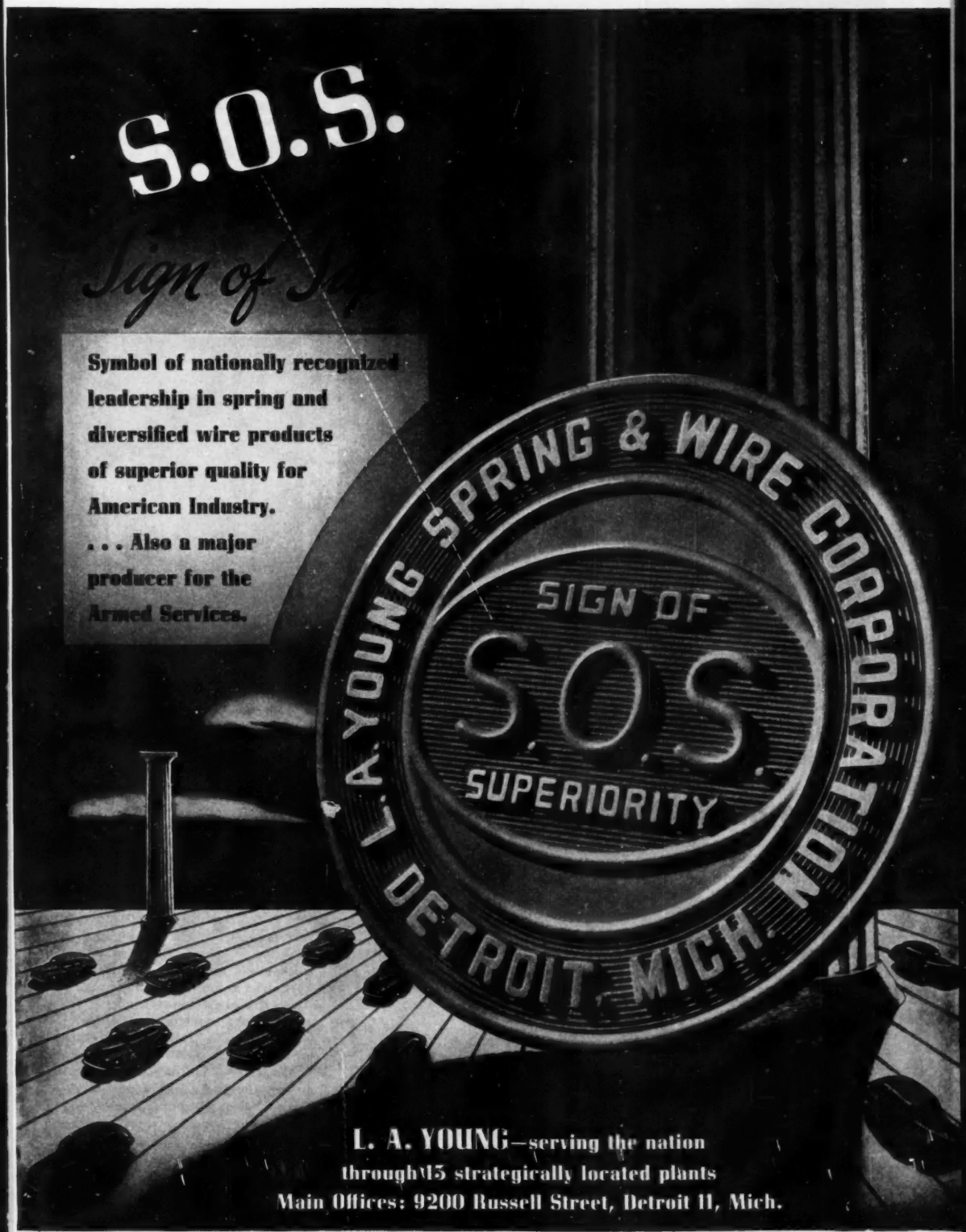
A display will feature a test unit designed and manufactured for use in development engineering for test work on rotary "O" ring development. The unit is adapted to supply readings for variable speeds, pressure, heat, and friction. Life tests are possible for determination of most suitable "O" ring compounds for use with various type materials and work conditions. *Continental Tooling Service, Inc., Booth 1027.*

Circle MS-35 on page 65 for more data

(*Turn to page* 150, *please*)



Continental "O" ring test unit.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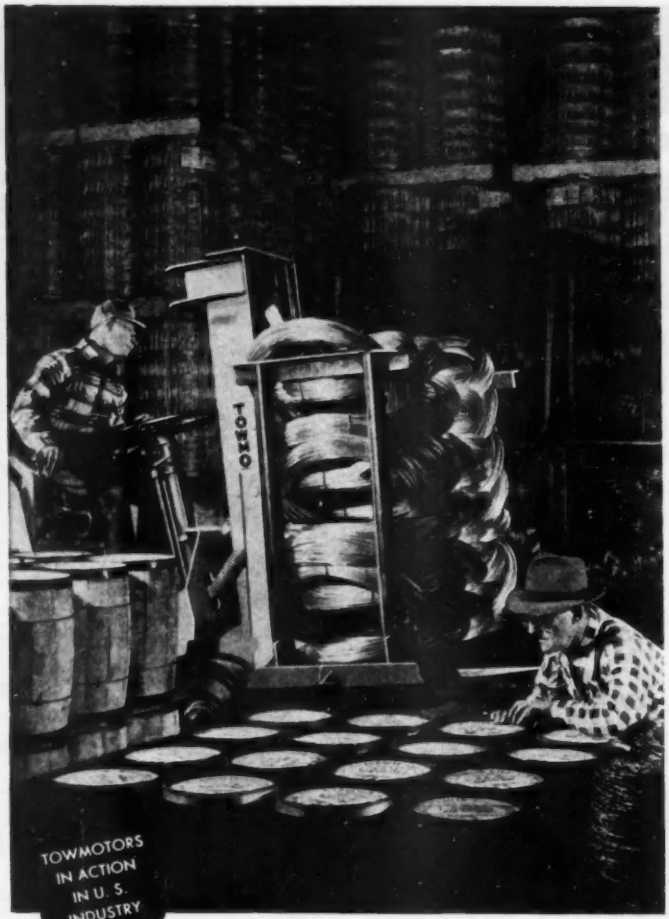

Handling heavy coiled wire with Towmotor at Jones & Laughlin Corp., Pittsburgh, Pa.

give production a big hand...

Towmotor makes one man ten times better when it comes to handling heavy loads at top-production speed. Output soars and handling costs sink accordingly... gains that fast cancel Towmotor's modest first cost. From then on it's a steady pay-off because there's real staying power built into Towmotor Mass Handling Equipment. "Man Hour Thieves" tells the whole timely story. Write for your copy and name of your nearest Towmotor Representative to: Towmotor Corporation, Div. 45, 1226 E. 152nd St., Cleveland 10, Ohio.

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THE ONE-MAN-GANG

FORK LIFT TRUCKS and TRACTORS
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RECEIVING • PROCESSING • STORAGE • DISTRIBUTION

What's New at the

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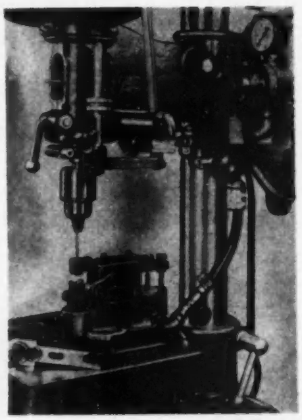
(*Continued from page* 148)

Drill Fixture

The Por-Matic air operated drill jig which will work up to one in. diam, will be displayed. Body of the fixture may be secured to the table of any regular ½ in. capacity drill press. By installation of a valve requiring two



Porter drill fixture, the Por-Matic.

tapped holes to mount it, the fixture is then opened and closed automatically by the vertical motion of the drill press spindle. The fixture will accommodate drill sizes up to 5/16 in. diam. *Porter Precision Products, Booth 1025.*

Circle MS-36 on page 62 for more data

Plating Conveyor

The recently developed load and unload plating conveyor will be a feature at the Exposition. This conveyor carries racks through a power washer, onto the automatic load and unload mechanism, which will transfer the work to an automatic plating machine. After the parts have completed the cycle of the machine, the conveyor will again take over and move the rack through a power dryer.

The complete unit is capable of producing 100 racks per hour. It occupies a space of approximately 38½ ft by 13½ ft. The conveyor uses the split rail principle. It is driven by an electric motor through a variable

(*Turn to page* 152, *please*)

SAVE WEEKS OF VALUABLE TIME!
It's easy to SHARPEN all types and sizes of BROACHES with this

VERSATILE LAPOINTE

UNIVERSAL BROACH SHARPENER

Built with simplified "Touch-Controls", it practically eliminates all need for skill in sharpening broaches. Any reasonably good tool man can do an expert job in no time at all!

We design and build a complete line of standard and special broaching machines, tools and fixtures.

Available in 3 SIZES: 60", 72" and 80", the LAPOINTE Universal BROACH SHARPENER occupies a surprisingly small floor area and will soon pay for itself *in time saved and money earned.* Attachments are available for backing-off.

Ask us about the **NEW 36" LAPOINTE** *Broach Sharpener designed especially for surface broaches. This sharpener has no head and tail stock, but uses a vise only. "Touch-Control" enables the operator to remove a minimum of stock, thus prolonging the life of the tool.*

Every plant that owns a broaching machine needs the LAPOINTE *Manual on Broach Sharpening.*

Ask for Booklet BSM-10

50 YEARS IN BROACHING
We're the oldest in the world!
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THE LAPOINTE MACHINE TOOL COMPANY
HUDSON, MASSACHUSETTS • U. S. A.
Branch Factory: Watford, Herts., England

THE WORLD'S OLDEST AND LARGEST MANUFACTURERS OF BROACHING MACHINES AND BROACHES

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(*Continued from page* 150)

speed pulley and a gear type speed reducer, on which is mounted a two-in. pitch sprocket to drive the hollow stud two-in. pitch roller chain. The sprocket is side mounted, that is, it is mounted beside the chain and is, therefore, a single tooth drive.

The chain is mounted directly over the center line of the work rail. True alignment with the rail is kept by means of guide shoes mounted on each work rail support.

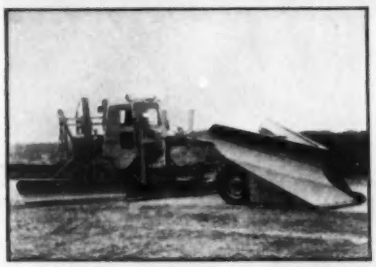
To keep the chain in adjustment, a sliding take-up is placed on one end of the conveyor. The sprocket is assembled in a separate framework which becomes an integral part of the conveyor and is adjusted by means of a single jack-screw. Collars are provided to fill the space in the rail caused by this adjustment.

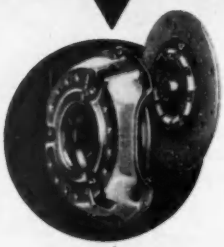
Work hooks are pushed along the rail by cast iron pushers attached to the chain by pins which pass through the hollow studs of the chain. The upper end of these pins fasten into limit switch trip blocks. Thus, each pusher and limit switch stop becomes a unit.

The limit switch for stopping the conveyor at the loader bar is mounted directly over the loader bar, and, as each individual workhook (rack) arrives at the loader, it is stopped by means of this limit switch and its own trip block at the exact desired position for loading. *Udylite Corp., Booth 216.*

Circle MS-37 on page 65 for more data

This Snow "Drift Buster"





Has Fourteen Foot Wings

Built strong enough to blast open snow jammed roads, the CHAMPION "Drift Buster's" shoulder wings make every road a winter highway. Heavy-duty ROCKFORD CLUTCHES help this powerful unit out-perform and out-last less rugged equipment. Let ROCKFORD clutch engineers help your product designers develop versatile power transmission control for your machines.

ROCKFORD CLUTCH DIVISION BORG-WARNER
315 Catherine Street, Rockford, Illinois, U.S.A.

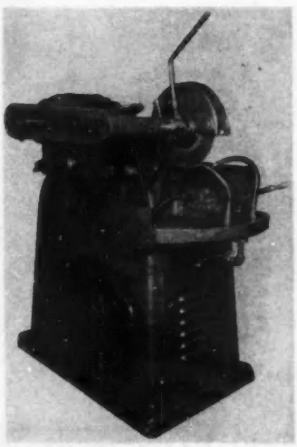
B-W ENGINEERING MAKES IT WORK
B-W PRODUCTION MAKES IT AVAILABLE

ENGINEERING BULLETIN SENT ON REQUEST

ROCKFORD CLUTCHES

Abrasive Cut-Off Machine

Radiac, Type J, an improved abrasive cut-off machine will be displayed. It has a capacity of 2½ in. diam solid metal and 3½ in. tubing. Maximum spindle speed is 2500 rpm.



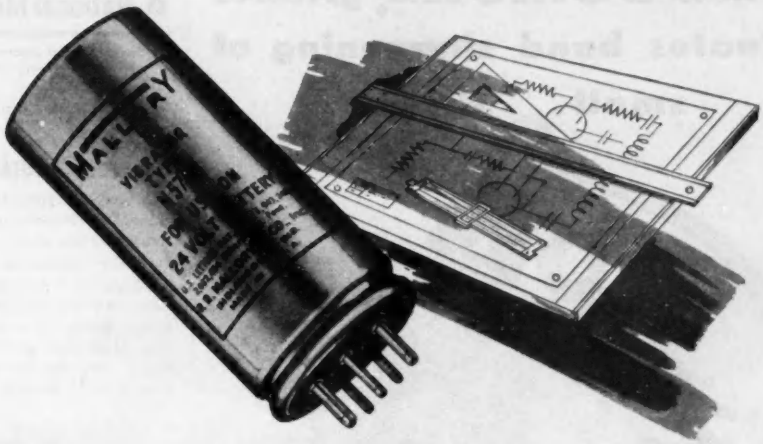
De Sanno abrasive cut-off machine, Model J.

A 10 hp, 1800 rpm motor is used for the main drive while a ¼ hp motor is utilized for driving the coolant pump. *A. P. de Sanno & Son, Inc., Booth 1252.*

Circle MS-38 on page 65 for more data

(*Turn to page* 154, *please*)

To avoid vibrator power supply troubles...



Call on MALLORY in the design stage

Vibrator power supplies need the best in design to meet the tough performance requirements of battery-operated electronic equipment. Experienced engineering must go into the selection of each element . . . transformer, vibrator, buffer capacitor . . . so each will perform its own function and operate with the others to provide maximum performance.

You can end your power supply worries by calling on Mallory to translate your power needs into a precisely engineered design. You'll save engineering time and reduce production costs. And you'll be assured of getting the power performance your equipment needs.

In vibrator design and production, Mallory offers you . . .

EXPERIENCE gained through years of working with leading manufacturers on a broad variety of vibrator applications . . . an unmatched fund of engineering skills in this field.

VIBRATORS for civilian and military use . . . produced by the organization which pioneered the development of commercial vibrators over 20 years ago and now supplies more vibrators for original equipment than all other makes combined.

ENGINEERING AND PRODUCTION FACILITIES that can design complete vibrator power supplies and manufacture them from start to finish . . . to your exact requirements.

Investigate Mallory's facilities now, whether your equipment is in production or still on the drawing board. Write or telephone today.

Vibrators and Vibrapack® Power Supplies

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SERVING INDUSTRY WITH THESE PRODUCTS:

Electromechanical—Resistors • Switches • Television Tuners • Vibrators
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P. R. MALLORY & CO., INC., INDIANAPOLIS 6, INDIANA

For information on Titanium Developments contact Mallory-Sharon Titanium Corp., Niles, Ohio.

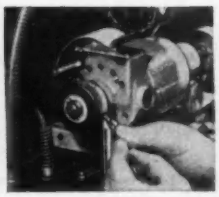
This new DUMORE grinder eliminates hand sharpening of small drills

HERE'S a remarkable new grinder that sharpens small twist drills with amazing speed and precision. Enables you to do away with expensive machine shop maintenance of 2-lip drills—No. 70 to ¼".

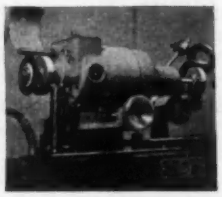
Capable of grinding a drill point to any included angle from 90° to 150°, and any clearance angle from 5° to 15°, small-size, dull and broken drills can be quickly sharpened and reclaimed. Dumore sharpened drills stay sharp much longer, even last longer. You get correct hole size and better hole finish every time. Scrap losses, too, are held to a minimum.

THESE FEATURES MAKE THE DUMORE PRECISION GRINDER BETTER

EXCLUSIVE FEED-IN ATTACHMENT — Eliminates breakage and wheel gouging. Allows fine control of finish cuts. Speeds difficult sharpening, requiring extreme changes of point or clearance angle.



BROKEN DRILL RECLAIMER —Drills can be rough ground and reshaped on roughing wheel . . . then sharpened. (Grooved drill rest also serves as holder and locating fixture for diamond wheel dresser.)



ECONOMICAL WHEEL COST — Only uses wheel face. No expensive, shaped wheels. Individual wheels for web-thinning and roughing, eliminating frequent wheel dressing, assure longer wheel life.

Ask your nearby industrial distributor for a demonstration of this time- and money-saving Dumore Drill Grinder, or write

THE DUMORE COMPANY

1339 Seventeenth Street • Racine, Wisconsin

What's New at the

• National Metal Show •

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(*Continued from page* 152)

Torch Guiding Machine

An oxy-acetylene torch guiding machine, the Ultra-Graph, will be demonstrated at the show. This unit automatically controls speed and path of torch travel. A permanent magnetic field provides positive attraction of power driven friction rotor to the edge of a steel pattern. Speed control is provided for cutting material from 1/16 in. to eight in. thick.

Heath torch guiding machine, the Ultra-Graph.

The Ultra-Graph handles fine detail work with tolerance as low as plus or minus 1/64 in. An unlimited variety of complex pattern shapes may be used including a 63 in. straight line, 32 in. diam complete circle, and 76 in. diam semi-circle. *Heath Engineering Co., Booth 916.*

Circle MS-39 on page 65 for more data

BOOKS . . .

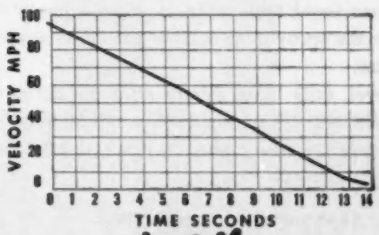
LEAD IN MODERN INDUSTRY, *published by Lead Industries Association, 420 Lexington Ave., New York, N. Y.* The manufacture, applications, and properties of lead, lead alloys, and lead compounds are covered in considerable detail in the above book. The various types of lead, their production from mine to finished metal, and their widespread contributions to modern living are analysed. Foremost among these, of course, is the automobile storage battery, and an entire chapter of the book is devoted to it. Another particularly interesting chapter lists in tabular form the correct specifications for lead, lead alloys, and lead products.

How to absorb 25 million FT-LBS of energy in 1000 feet!

This deceleration chart shows what happens when a pilot brings his 20 ton ship in for a landing. During this stop, terrific heats and pressures are created. Yet planes must stop safely... and quick!

American Brakeblok attacked this problem during World War II. Working closely with aviation brake manufacturers we developed the formulas to do the job. We helped solve some very difficult manufacturing problems, created mass-production methods and equipment.

Today we are a major supplier of aviation brake lining. Our research laboratories, manufacturing facilities and years of experience are ready to serve—either for military or civilian needs.



American Brakeblok

THE SAFETY BRAKE LINING

Brake Shoe

Copyright 1952—American Brake Shoe Co.

AMERICAN BRAKEBLOK DIVISION
DETROIT 9, MICHIGAN

industrial spray finishing equipment

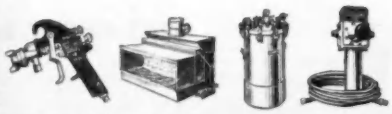
engineered to your requirements

With Binks Material Handling Pumps, you deliver "heavy" materials—like sound deadeners, dopes, adhesives, buffing compounds, sealing compounds, rust preventatives, gear lubricants and many others heretofore considered impossible to pump—*directly from the original containers* to the spray guns or flow guns. You save up to 15% in handling time alone.

Moreover, only Binks Pumps offer the Surge Control, a new device that eliminates the annoying "spurt" of material when the operator first triggers the spray gun...gives you smoother coatings and saves expensive material.

Send today for manual 700
12 pages filled with data to help you select the *right* pump for dozens of money-saving applications. No obligation.
Address: Binks Manufacturing Company
3120-30 Carroll Ave., West,
Chicago 12, Illinois

Binks
EVERYTHING FOR SPRAY PAINTING



GUNS • SPRAY BOOTHS • MATERIAL TANKS • EXTRACTORS & ACCESSORIES

REPRESENTATIVES IN PRINCIPAL U. S. & CANADIAN CITIES • SEE YOUR CLASSIFIED DIRECTORY

MEN *in the* NEWS

(*Continued from page* 25)

Hertz Driv-Ur-Self System, Inc.—**Walter L. Jacobs** was reelected president recently of this General Motors Corp. subsidiary. Named to the board were **R. C. Gerstenberg,** GM assistant **comptroller, and V. P. Blair, F. J. Limback,** and **P. J. Monoghan** of the GM Truck and Coach Div.

Ranco Inc.—**Arthur M. Hoover** was elected president recently to succeed **E. C. Ramey,** who is now chairman of the board. **W. R. Opp** was elected vice-president in charge of manufacturing.

White Motor Co.—**H. R. Stickel** has been named assistant to the president, in charge of public relations and national fleet sales.

Visi-Trol Engineering Co.—**Sam R. Read** has been named a staff engineer.

Marman Products Co.—Appointment of **A. Dale Herman** as vice-president and general manager was announced recently.

Pierce Governor Co.—**Lionel B. Hakes** was appointed vice-president in charge of sales.

Le Roi Co.—Recently elected directors were **E. O. Boshell, G. V. Meyers,** and **J. Carlson** of Westinghouse Air Brake Co.

New York Air Brake Co.—**Charles T. Zaoral** will join the firm Nov. 1 as vice-president in charge of operations, having been elected a director last month.

Jacobs Aircraft Engine Co.—**Alfred R. Bridgford, Jr.,** has joined the helicopter development section.

Detroit Harvester Co.—**Frank L. Dempsey, Jr.,** is sales manager of the newly acquired subsidiary, Henry & Allen Corp.

Ford Motor Co. of New Zealand—**Brock F. Jamieson** has been appointed managing director, replacing **Ralph K. Johnson** who has retired to Canada.

Temco Aircraft Corp.—**Capt. A. C. Olney, USN Ret.,** has joined the firm as special assistant to the president. **J. T. Butler** joined the firm as chief tool engineer.

(*Turn to page* 158, *please*)

You can save MONEY and MATERIALS with ROLLED BUSHINGS

FEDERAL MOGUL

SINCE 1899

FEDERAL-MOGUL CORPORATION **11037 SHOEMAKER, DETROIT 13, MICH.**

MEN *in the* NEWS

(*Continued from page* 156)

Willys-Overland Motors, Inc.—**Robert H. Green** has been appointed farm sales manager.

Kaiser-Frazer Corp., Aircraft Div.—**Tjark F. Riddle** was recently named plant manager.

Owens-Corning Fiberglas Corp.—**Clifford L. Rowley** is head of the new battery and process products division.

American Brake Shoe Co.—**Kempton Dunn** was elected a director of the company.

Goodyear Tire and Rubber Co.—**Leland E. Spencer** has become assistant to the president.

Barksdale Valves, Inc.—**M. C. Nelson** was appointed vice president and a director.

Marquardt Aircraft Co.—**Jack Anderson** has been appointed manager of public relations and advertising.

Cadillac Motor Car Div., General Motors Corp.—Retirement of **J. W. Dunivan** after 44 years of service on the sales staff was recently announced.

Garrett Corp.—**W. C. Whitehead** has been elected executive vice president.

AiResearch Mfg. Co., div. of Garrett Corp.—**B. N. Snow**, vice president in charge of sales, will now work on special assignments out of the president's office. **W. J. Pattison**, assistant to the president, is now director of sales and service for the division.

Pacific Airmotive Corp.—**Anthony J. Kreiner** was appointed manager of the manufacturing division.

Goodyear Tire & Rubber Co.—**Vernon H. Jones** has been appointed manager of car and home merchandising.

Kaiser-Frazer Corp.—The appointment of **Sydney W. Taylor** as assistant general manager of the aircraft division has been announced.

Lake Erie Engineering Corp.—**John Alico** has been appointed project engineer.

Detroit Testing Laboratory—**Eugene V. Ivanso** has been named head of metallurgical engineering.

Prewitt Aircraft Co.—**Norman J. Burke** has been appointed to a newly-created position encompassing duties of controller and treasurer.

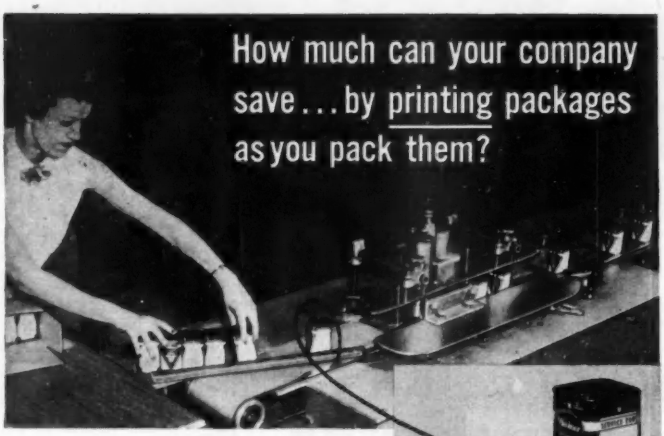
Lincoln Engineering Co.—The appointment of **Carl H. Mueller** to the position of director of engineering has been announced.

General Controls Co., Aircraft Controls Div.—**W. H. Moore** has been appointed factory sales engineer.

Allied Products Corp.—Recent additions to the company are **Merle E. Kremer** as assistant to the president, **Wynne R. Lilly** as supervisor of new product development, and **Milton M. Stenstrom** as director of employee and personnel relations.

Stanley Aviation Corp.—**Richard H. Frost** has been promoted to chief engineer.

U. S. Rubber Co., Tire Div.—**Thomas J. DeCorte** was appointed Detroit public relations representative recently.



Gottscho MARKOCODER slashes package inventories . . . eliminates production-line down-time . . . cuts losses from package obsolescence . . . simplifies inventory control . . . reduces labor cost.

Here's the new cost-cutting way to make a single basic package do for **dozens** of different parts and accessories. Place a MARKOCODER in your line—let it print name, number, other product identification on one or more blank panels of a partially-printed container . . . **automatically** . . . as an integral packaging function. The MARKOCODER synchronizes with other mechanized operations . . . delivers accurately registered "print-quality" impressions consistently. Prints cartons, boxes, cans or canisters . . . on top, ends or bottom. Quickly adjustable for copy changes, packages of different size. Designed for top efficiency under continuous heavy production schedules. Requires only 5 minutes for daily cleanup.

Get the whole cost-saving story of the MARKOCODER; write today for Brochure APM

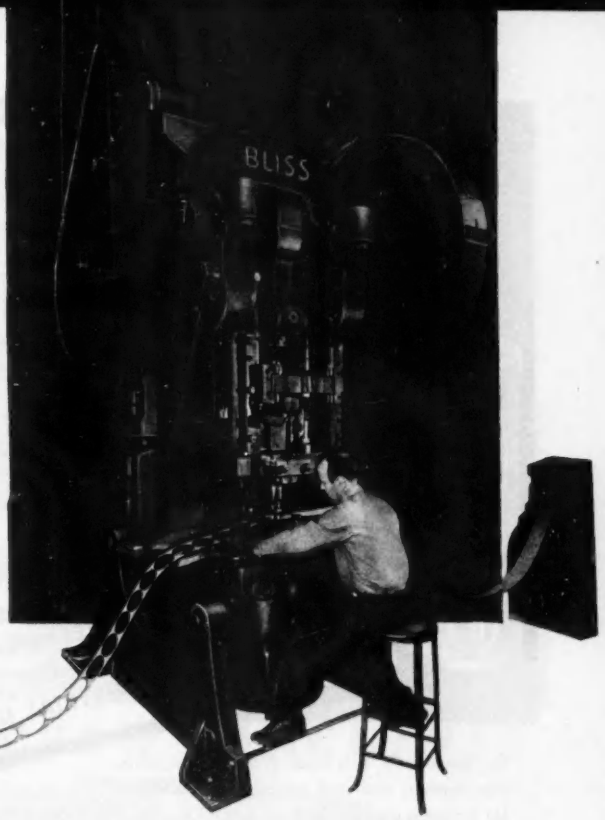
ADOLPH GOTTSCHO, INC., Hillside 5, N. J.

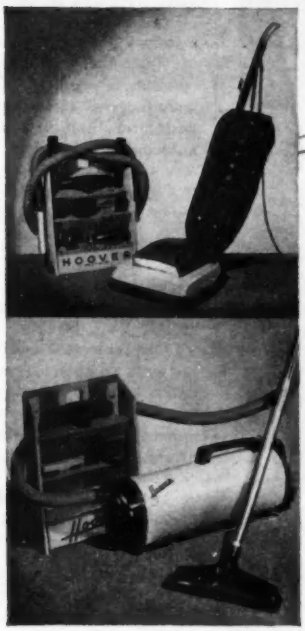
Machines to MARK whatever you MAKE

Gottscho

Bliss...

The Presses That Outsell All Others Dominate Hoover's Press Room, Too...





Punch presses must be versatile to produce the range of metal stampings needed for Hoover Company's famous upright and tank-type vacuum cleaners. They must be rugged, too, to withstand the hard usage demanded by heavy production schedules. That's why Bliss Inclinables dominate Hoover's press room...represent 90% of the stamping equipment at the North Canton, Ohio, plant. As Hoover's press room superintendent puts it, "Even the oldest of our Bliss presses works perfectly; maintenance for all twenty-six is negligible."

More than 50,000 Bliss Inclinable Presses are now serving industry. And despite heavy demands for these presses, Bliss' expanded facilities make it possible to provide early deliveries of certain sizes. Your local Bliss sales engineer can give you full information.

E. W. BLISS COMPANY, CANTON, OHIO
E. W. Bliss (England) Ltd., Derby, England
E. W. Bliss Company (Paris), St. Ouen sur Seine, France
PRESSES, ROLLING MILLS, SPECIAL MACHINERY

Branch offices in Chicago, Cleveland, Dayton, Detroit, Indianapolis, New Haven, New York, Philadelphia, Rochester, Toledo, and Toronto, Canada. **West Coast representatives:** Moore Machinery Company, Los Angeles and San Francisco; Star Machinery Company, Seattle. **Other Dealers** in United States and cities throughout the world.

EARLY DELIVERY OF CERTAIN SIZES

From a single press for a given job...
to a complete press room...

It's Bliss

For example, V. P. I. Liners (Vapor Phase Inhibitor) prevent rust and corrosion without need for covering products with oil, grease or wax. These and other new type liners protect spare parts from corrosion, for years, when metal ends are seamed on the container.

Two New Types Available Are - - - -

THE UNIT PACK for individual items meets exacting government specifications. For parts such as spark plugs, valves, meters, seal beam lamps, precision gears, gauges and bearings. (Seaming machines are furnished.)

THE INTERMEDIATE TYPE is for group packaging a variety of parts and materials. Made in telescope style with metal ends and heavy wall construction for added strength. For items such as nuts, washers, bolts, fuses, repair kits and fittings.

Write for complete information as to the type and construction of container for your exact needs.

The CLEVELAND CONTAINER Co.
6201 BARBERTON AVE. CLEVELAND 2, OHIO
• All-Fibre Cans • Combination Metal and Paper Cans
• Spirally Wound Tubes and Cores for all Purposes
PLANTS AND SALES OFFICES: Cleveland, Detroit, Chicago, Plymouth, Wisc., Jamesburg, N. J., Ogdensburg, N. Y. • ABRASIVE DIVISION at Cleveland
SALES OFFICES: Grand Central Terminal Bldg., New York City; Washington Gas Light Bldg., Washington, D. C.; West Hartford, Conn.; Rochester, N. Y.
Cleveland Container Canada, Ltd., Prescott, Ontario • Offices in Toronto and Montreal

Industry News

(*Continued from page* 23)

Federal Mogul Proposes 3 for 2 Stock Split

Federal Mogul Corp. stockholders will vote Oct. 8 on a proposal to increase authorized shares and a three-for-two stock split. After approval is given, shares will be increased to 900,000 from 600,000. New stock will be issued on Oct. 31 to voters of record Oct. 20 on the basis of ½ share of new stock for each share of old stock.

Carter Carburetor Plans New Plant

Carter Carburetor Corp. is reported to be planning a $2 million expansion program. It has been issued a building permit for a new assembly plant at Olivette, a suburb of St. Louis, Mo., to cost approximately $800,000. Carter, a subsidiary of American Car and Foundry Co. operates a plant at St. Louis which manufactures carburetors, governors, fuel filters and fuel pumps for the automotive industries.

LaPlant-Choate Holders Approve Sale to A-C

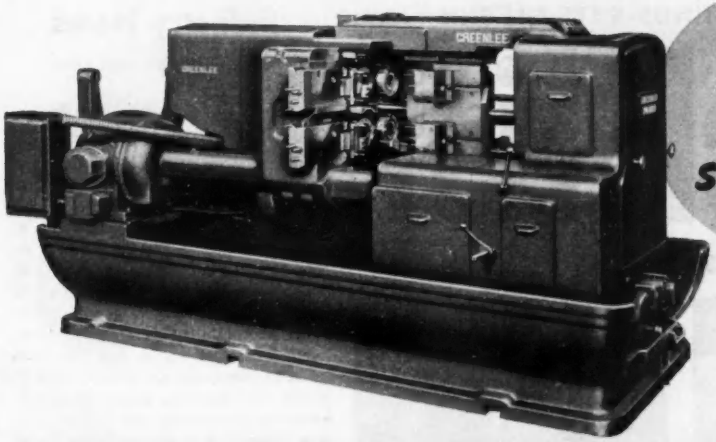
Stockholders of LaPlant-Choate Mfg. Co. of Cedar Rapids, Iowa, have unanimously approved sale of the company to Allis-Chalmers Manufacturing Co. LaPlant makes earth-moving equipment and its output will augment equipment produced by the Allis-Chalmers Tractor Div. Acquisition of the LaPlant works brings the number of Allis-Chalmers plants to fifteen.

Chrysler War Orders Nearly $2.3 Billion

Chrysler Corp. has revealed that its total defense commitments now amount to $2.292 billion for military facilities and products. More than a billion dollars of the total is for Patton T-48 tanks. Other military commitments include tank engines; plane hulls; wing, tail, and fuselage sections; trucks, range finders; automotive replacement parts; shell rotating bands; mortar shells; submarine nets, ignition boxes, tank spacers, and shipping crates.

(*Turn to page* 162, *please*)

Don't let the Other Fellow vote for you Nov. 4



4 SPINDLE

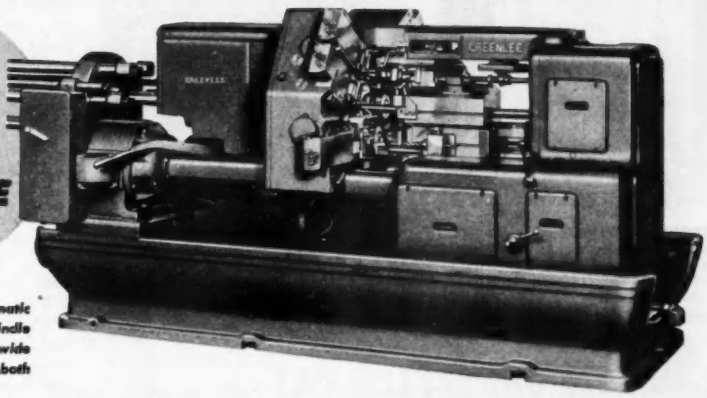
THE GREENLEE "FOUR"

A heavy-duty automatic made in 1⅝" and 2⅛" spindle capacities. The "Four" incorporates all the cost-cutting features of the well-known "Six" (see below).

GREENLEE

AUTOMATIC SCREW MACHINES

6 SPINDLE



THE GREENLEE "SIX"

A ruggedly-built, high-speed automatic . . . available in 1", 1⅝", and 2" spindle capacities . . . capable of handling a wide range of work . . . widely used on both short and long-run jobs.

OUTSTANDING FEATURES OF ALL GREENLEE AUTOMATICS

Write for literature describing in detail all the features of Greenlee Automatics.

PRODUCTION MACHINERY
GREENLEE

UNIVERSAL TOOLING — Tool holders fit any cross-slide cavity . . . are easily and quickly changed . . . reduce equipment costs.

INTERCHANGEABLE CAMS — Can be changed at will without re-adjustment of tools and holders. Cam storage is held to a minimum . . . cam costs greatly reduced.

BUILT-IN THREADING DRIVE AND FEED — Not an extra attachment, but standard equipment on Greenlee Automatics.

BUILT-IN COOLANT SYSTEM — Eliminates cumbersome piping in tooling area . . . gets coolant right where it does the most good.

LARGE TOOLING AREA — Permits using many timesaving, cost-cutting auxiliaries that often eliminate second operations.

Various special adaptions of standard Greenlee Automatics can be made . . . for handling second-operation work . . . for tooling extra-long work pieces . . . for multiple feed-out arrangements, etc.

Send us details of your work. Let our engineers show you how profitably Greenlee Automatics can be applied to your production.

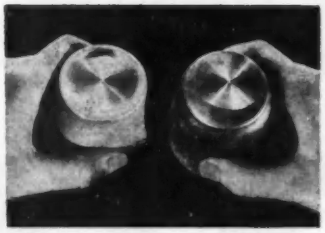
GREENLEE BROS. & CO., 1760 Mason Ave., Rockford, Ill.

MULTIPLE-SPINDLE DRILLING, BORING, TAPPING MACHINES • AUTOMATIC SCREW MACHINES • AUTOMATIC TRANSFER PROCESSING MACHINES

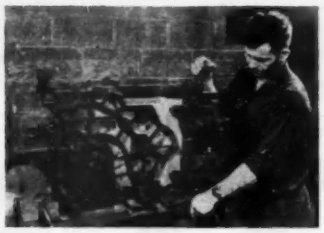
HOW DO YOUR CASTINGS RATE ON THIS

Check List

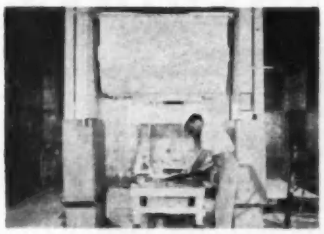
FOR ALUMINUM CASTINGS?



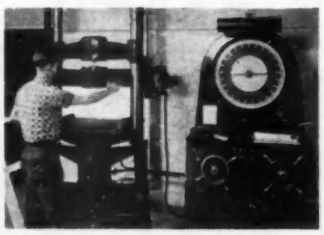
☑ **Freedom from Pinhole Porosity?**
Are sections of castings from each heat examined for pinhole porosity? That's the practice at Acme Aluminum Alloys where every heat must *prove* it has been properly degassed.



☑ **Close Dimensional Tolerances?**
Do your aluminum sand castings meet specifications for accuracy and freedom from external blemishes? Acme castings do . . . up to 1/64" accuracy on small sizes . . . up to 1/32" accuracy on large.



☑ **Freedom from Hidden Defects?**
Are you machining your aluminum castings as much as 75% complete only to discover hidden defects? Foundry practice at Acme uses X-ray to *prevent* defects, can be used for 100% X-ray.



☑ **Accurate Mechanical Properties?**
Are mechanical properties tested by test bar or a section from one of your castings? Using an actual casting produces more accurate results . . . is the method used by Acme.

A 6-point laboratory control system explains the outstanding quality of Acme aluminum castings. Moisture analysis of foundry sand . . . porosity analysis of each melt prior to pouring . . . analytical control by spectroscope . . . mechanical control by test castings . . . heat treat control to ± 5° F. by automatic equipment . . . hidden defects revealed by X-ray examination: this is the way Acme guards casting quality. *Are you getting top quality aluminum castings?*

Foundry Division

Acme

ALUMINUM ALLOYS, INC.
11 N. Findlay St., Dayton 3, Ohio

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Please send me your latest bulletin, without obligation on my part.

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Name .....
Street .....
City ..... State .....

Industry News

(*Continued from page* 160)

Ordnance Builds Mobile Gage Inspection Unit

The Detroit Arsenal engineering section has developed an air-conditioned mobile gage laboratory for checking precision instruments at defense plants. The laboratory on wheels will visit contractor plants to make surveillance inspections of gages used by inspectors who determine acceptability of Ordnance materiel. Practice up to now has been to send the gages to central laboratories for checking, entailing considerable inconvenience and lost production time. Instruments must be checked every 30 days to six months, depending on type and use.

The first of several mobile gage laboratories will be used by the Detroit Ordnance District. It is housed in a commercial six-ton trailer 28 ft long. Walls, floors, and ceiling are heavily insulated, and the laboratory contains two heating and two refrigeration units to provide a constant 68F temperature under all weather conditions. Power is provided through an extension cable which plugs into a factory outlet.

Included among the instruments in the first unit are:

1. A Pratt & Whitney length measuring machine, 48 in. long and accurate to 10 micro-in.

2. A Kodak contour optical projector with both vertical and horizontal light projection and surface illumination in color. The projection ranges from ten to 100 magnifications.

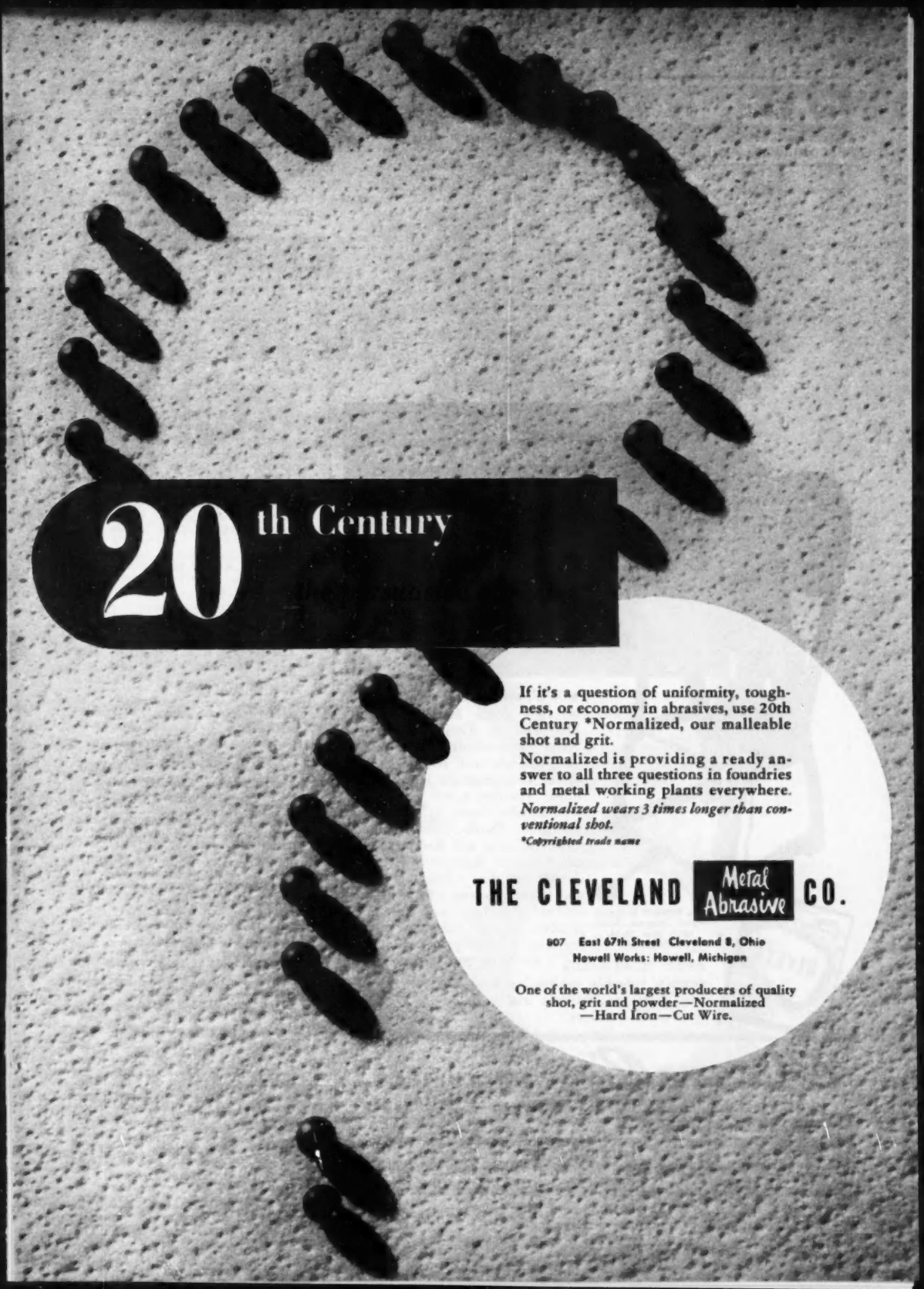
3. A Sheffield internal measuring machine for measuring inside diameters with an accuracy to 50 micro-in.

4. A Brush Surfa-gage for measuring surface finish to one micro-in.

5. Other instruments such as a Pratt & Whitney super-micrometer, a Sheffield tool makers comparator, three granite surface plates, a cabinet containing a set of cylindrical plugs in increments of one-thousandth in., varying in size from 30 one-thousandths in. to one-half in., and a large complement of small and accessory type checking equipment.

Skilsaw Changes Name

Skil Corp. is the new name of Skilsaw, Inc., Chicago manufacturer of portable electric and pneumatic tools. The change became effective Oct. 1.


20th Century
If it's a question of uniformity, toughness, or economy in abrasives, use 20th Century *Normalized, our malleable shot and grit.
Normalized is providing a ready answer to all three questions in foundries and metal working plants everywhere.
Normalized wears 3 times longer than conventional shot.
*Copyrighted trade name
THE CLEVELAND Metal Abrasive CO.
807 East 67th Street Cleveland 8, Ohio
Howell Works: Howell, Michigan
One of the world's largest producers of quality shot, grit and powder—Normalized —Hard Iron—Cut Wire.

CALENDAR

OF COMING SHOWS AND MEETINGS

National Safety Congress, Chicago, Ill. .....Oct. 20-24

National Metal Show, Convention Hall, Phila., Pa. .....Oct. 18-24

National Metal Congress; Am. Society for Metals—Hotel Ben Franklin, Am. Welding Society—Bellevue - Stratford Hotel, Inst. of Metals Div. of Am. Institute of Mining and Metallurgical Engineers—Hotel Adelphia, Society for Non-Destructive Testing—Hotel Sylvania, Phila., Pa. .....Oct. 18-24

37th International Motor Exposition, London, England .....Oct. 22-Nov. 1

SAE Transportation Meeting, Pittsburgh, Pa. .....Oct. 22-24

American Gear Manufacturers Association, semi-annual meeting, Edgewater Beach Hotel, Chicago, Ill. .....Oct. 26-29

Transport Aircraft Hydraulic Conference, Park-Sheraton Hotel, Detroit, Mich. .....Oct. 28-29

American Society of Body Engineers, Seventh Annual Technical Convention, Rackham Bldg., Detroit, Mich. .....Oct. 29-31

Fifth Annual AIEE Machine Tool Conference, Albany, N. Y..Oct. 29-31

SAE National Diesel Engine Meeting, St. Louis, Mo. .....Oct. 30-31

16th Annual Time and Motion Study and Management Clinic, Industrial Management Society, Sheraton Hotel, Chicago, Ill. Nov. 5-7

SAE National Fuels and Lubricants Meeting, Mayo Hotel, Tulsa, Okla. .....Nov. 6-7

Third Annual International Motorama, Los Angeles, Calif..Nov. 7-16

2nd Annual Midwestern Tool Engineering Conference, Urbana, Ill. Nov. 8

API 32nd Annual Meeting, Conrad Hilton Hotel, Chicago, Ill..Nov. 10-13

Montreal Tool and Equipment Show, Show Mart Building, Montreal, Canada .....Nov. 11-14

Automobile Old Timers, 13th Anniversary Dinner, Hotel Astor, New York, N. Y. .....Nov. 13

AIEE Technical Congress on Instruments, Hotel Ben Franklin, Phila., Pa. .....Nov. 17-18

Third Annual Mexican Road Race, El Ocotal-Nogales .....Nov. 19-24

7th Midwest Conference, American Society for Quality Control, Claypool Hotel, Indianapolis, Ind. .....Nov. 20-21

American Standards Association, 34th Annual Meeting, Hotel Waldorf-Astoria, New York, N. Y. .....Nov. 25

Society for Experimental Stress Analysis, Annual Meeting and Exhibition, Hotel McAlpin, New York, N. Y. .....Dec. 3-5

National Standard Parts Association Congress, Ambassador Hotel, Atlantic City, N. J.....Dec. 8-9

Automotive Service Industries Show, Atlantic City, N. J.....Dec. 10-13

1953

43rd National Motor Boat Show, Grand Central Palace, New York, N. Y. .....Jan. 9-17

SAE Annual Meeting, Sheraton-Cadillac Hotel, Detroit, Mich. Jan. 12-16

Plant Maintenance Show, Public Auditorium, Cleveland, Ohio. Jan. 19-22

Western Computer Conference, Hotel Statler, Los Angeles, Calif. .....Feb. 4-6

National Transport Vehicle Show and Fleet Maintenance Exposition, New York, N. Y.....Feb. 24-27

Pacific Automotive Show, Civic Auditorium, San Francisco, Calif. .....Feb. 26-Mar. 1

American Society for Testing Materials, Spring Meeting, Detroit, Mich. .....Mar. 2-6

National Association of Corrosion Engineers Ninth Annual Conference and Exhibition, Hotel Sherman, Chicago, Ill. ...Mar. 16-20

German Vehicle Show, Frankfort, Germany .....Mar. 19-29

Eighth Western Metal Congress, Pan-Pacific Auditorium, Los Angeles, Calif.....Mar. 23-27

Fifth Materials Handling Exposition, Convention Hall, Philadelphia, Pa. .....May 18-22

American Society for Testing Materials, Chalfonte-Haddon Hall, Atlantic City, N. J....June 29-July 3

Eighth National Instrument Conference and Exhibit, Chicago, Ill. .....Sept. 21-25

LOWER THE BOOM ON COSTS

SET RIVETS FAST

2 at a time with the Chicago "214"

• With every press on foot pedal Model 214 Chicago Double Rivet Setter automatically feeds, inserts and clinches *two* rivets. 14-inch throat accommodates large assemblies. Handles 9/64" or smaller steel tubular rivets, ¾" or less in diameter. Quick Change Rotary Type Hoppers and Raceways permit 5-minute changeover to rivets of different size. Adjustable anvils and riveting centers add to its versatility. For help with fastening problem . . . send sample of assembly (or a blue print) for free fastening analysis.

See EXHIBIT National Metal Congress, Booth 1819, Oct. 20-24, Philadelphia

FREE CATALOG contains valuable engineering information, rivet specifications and descriptions of 26 machines.

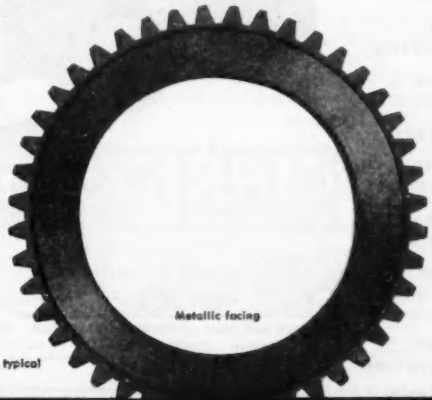
Chicago Rivet & MACHINE CO.

9612 West Jackson Boulevard, Bellwood (Chicago Suburb) Illinois

Branch Factory: Tyrone, Pa.

Using the right friction material

IMPROVES PERFORMANCE!



Parts shown are typical

Moraine's proved ability to mass-produce specially developed parts incorporating friction materials, is acknowledged by industry. A wide range of materials, including sintered metal, and various semi-metallic and non-metallic facings, offer different frictional characteristics as required.

Applications are broad. Moraine materials are in standard use on automatic transmissions such as Hydra-Matic, Powerglide, and Dynaflow. The basic techniques involved have many additional applications in the automotive and household appliance fields and in military vehicles, apparatus, and equipment.

Look to Moraine if you are using substantial quantities of parts incorporating friction material facings.

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DIVISION OF GENERAL MOTORS · DAYTON, OHIO

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The detailed features of these new UTILITRUCS show why they master the ever-increasing burdens put upon materials handling equipment by modern production methods and techniques. See for yourself why they set new high standards for the fork-truck industry.

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AND POWERED HAND TRUCKS • INDUSTRIAL TOWING TRACTORS

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AUTHORIZED CLARK INDUSTRIAL TRUCK PARTS AND SERVICE STATIONS IN STRATEGIC LOCATIONS

More Defense Contract Awards

THIS latest list of defense prime contracts that have been awarded covers the period from August 15 to September 21. Items included in this list are for various types of automotive military equipment, including tanks, motorized gun carriages, trucks, warplanes, automotive components and spare parts, automotive maintenance equipment, etc.

—A—

AC Spark Plug Division, GMC, Flint 2, Mich.
Vehicle parts—25,200 ea—$39,155

A. P. Paris Corp., Toledo, Ohio
Vehicle parts—31,400 ea—$43,168

Active Gear Co., Inc., Chicago, Ill.
Vehicle parts—8,000 ea—$30,480
Vehicle parts—1,080 ea—$198,720
Vehicle parts—22,200 ea—$66,808
Vehicle parts—18,600 ea—$99,504

Ainsworth Mfg. Corp., Detroit, Mich.
Vehicle parts—3,200 ea—$80,222
Primer, percussion—11,650—$388,527

Allison Division, GMC, Indianapolis Indiana
Vehicle parts—200 ea—$37,780

American Fabricating Co., Detroit, Mich.
Vehicle parts—5,400 ea—$83,430

Automotive Gear Co., Subsidiary-Chatterproof Glass Corp., Detroit, Mich.
Vehicle parts—17,000 ea—$97,580

W. G Avery Body Co., Jackson, Miss.
Vehicle parts—7,500 ea—$66,075

—B—

Beech Aircraft Corp., Witchita, Kansas
Airplanes—55—$3,798,865

Bendix Westinghouse Automotive Air Brake Co., Elyria, Ohio
Vehicle parts—11,800 ea—$262,668

The Budd Company, Detroit, Mich.
Hardware—1,530 ea—$26,140

—C—

Campeau Tool & Die Co., Wayne, Mich.
Vehicle parts—740 ea—$31,598

Chevrolet Motor Div., GMC, Detroit, Mich.
Truck—236 ea—$318,162

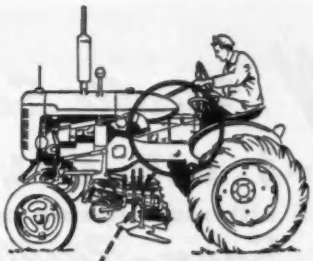
Chrysler Corp., Detroit, Mich.
Vehicle parts—114,700 ea—$26,485
Vehicle parts—54,000 ea—$33,466
Automotive spare parts—8,850—$75,299

Clark Cable Corp., Cleveland 2, Ohio
Vehicle parts—150 ea—$29,716
Vehicle parts—200,000 ea—$25,200
Vehicle parts—500 ea—$30,600

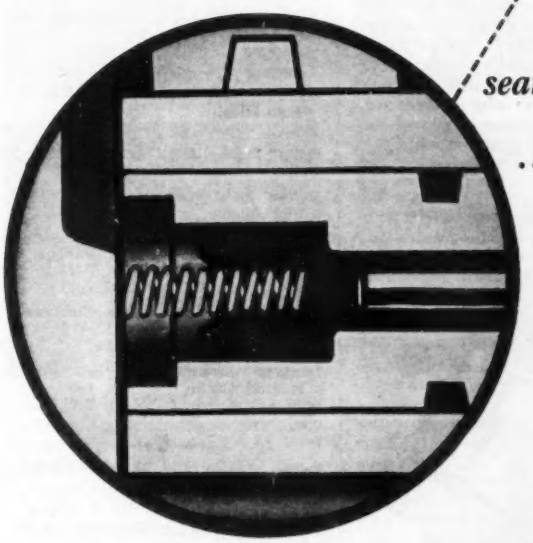
Cogmatic Company, Milwaukee, Wis.
Vehicle parts—9,800—$264,600

Columbian Steel Tank Company, Kansas City, Mo
Vehicle parts—7,400 ea—$28,347

(*Turn to page* 168, *please*)



Leak-proof check valve of resilient Du Pont nylon



seats perfectly without machining,

...gives long, trouble-free service

Two nylon check valves, like the one above, stop the flow of oil from either side of the hydraulic power piston. Thus, they keep the plow or other implement locked in position at the proper level. *The valves are molded by Formold Plastics, Inc., Chicago.*

For the hydraulic Touch-Control lift on "Farmall" tractors, International Harvester engineers needed a perfectly leak-proof check valve. This vital part traps oil on both sides of the power piston, thus holding the implement rigidly in the selected position. By molding the valve of Du Pont nylon, many advantages over the former metal part have been obtained.

Because of its resiliency, the nylon plastic part provides a tight seal, even if there are slight imperfections in the mating surface . . . does not become worn or grooved after repeated contact with the bushing. Too, the nylon part is made in one piece by the rapid mass-production injection-molding process . . . needs no costly machining to provide a smooth seat within close tolerances.

Du Pont nylon withstands the high temperature of the oil in the system (up to 200° F.), and remains dimensionally stable, chemically inert. Two years of trouble-free service in "Farmall" tractors have demonstrated the value of nylon valve seats.

Perhaps nylon's strength, resiliency and other valuable properties can help solve a problem for you. For further information on nylon and other Du Pont plastics, write:

E. I. du Pont de Nemours & Company (Inc.)
Polychemicals Department, District Offices:
350 Fifth Avenue, New York 1, New York
7 S. Dearborn St., Chicago 3, Illinois
845 E. 60th St., Los Angeles 1, California

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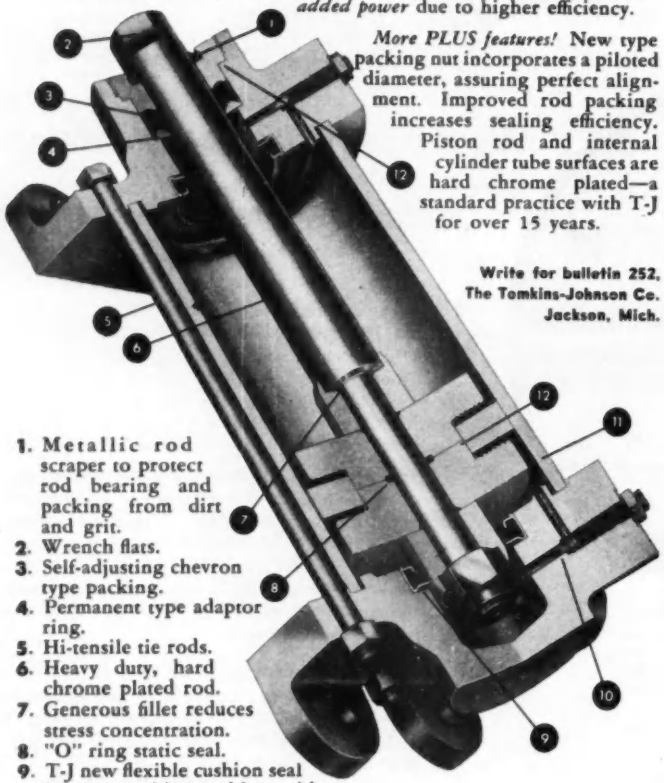
Designed with revolutionary application of

Super-Cushion

It's *sealed with pressure*—a revolutionary T-J application of flexible sealing that insures positive cushion action combined with automatic valving action for fast return stroke . . . eliminates binding and sticking . . . operates with *low friction, minimum wear,* and *added power* due to higher efficiency.



More PLUS features! New type packing nut incorporates a piloted diameter, assuring perfect alignment. Improved rod packing increases sealing efficiency. Piston rod and internal cylinder tube surfaces are hard chrome plated—a standard practice with T-J for over 15 years.

Write for bulletin 252, The Tomkins-Johnson Co. Jackson, Mich.

1. Metallic rod scraper to protect rod bearing and packing from dirt and grit.
2. Wrench flats.
3. Self-adjusting chevron type packing.
4. Permanent type adaptor ring.
5. Hi-tensile tie rods.
6. Heavy duty, hard chrome plated rod.
7. Generous fillet reduces stress concentration.
8. "O" ring static seal.
9. T-J new flexible cushion seal insures positive cushion with automatic valve action for fast return stroke. (Patent applied for)
10. Fine cushion adjustment.
11. Heavy wall precision honed hard chrome plate.
12. Controlled packing compression with metal to metal contact.

36 YEARS' EXPERIENCE (T-J)

TOMKINS-JOHNSON

RIVITORS . AIR AND HYDRAULIC CYLINDERS . CUTTERS . CLINCHORS

(*Continued from page* 166)

Comet Industries, Franklin Park, Illinois
Vehicle parts—718 ea—$75,410

Construction Materials Div., General Electric Co., Bridgeport, Conn.
Vehicle parts—2,000 ea—$1,016,660

Continental Motors Corp., Detroit, Mich.
Tank spare parts—2,775—$9,569,502

Continental Motors Corp., Muskegon, Mich.
Tank spare parts—5,617—$115,253
Engine assembly—335—$2,696,939

— D —

Dana Corporation, Toledo, Ohio
Vehicle parts—20,945 ea—$50,848
Vehicle parts—22,737 ea—$93,267

Dayton Rubber Co., Dayton, Ohio
Vehicle parts—315 ea—$51,518
Vehicle parts—315 ea—$51,518

Delco Products, Dayton, Ohio
Vehicle parts—250,000 ea—$355,000

Detroit Aluminum & Brass Corp., Detroit, Mich
Vehicle parts—3,090 ea—$31,697
Vehicle parts—36,070 ea—$61,560

Detroit Diesel Engine Div., GMC, Detroit, Mich.
Repair parts—174,959—$124,915

Detroit Sleeve Mfg. Co., Detroit, Mich.
Vehicle parts—18,607 ea—$48,378

Detroit Steel Products Company, Detroit, Mich.
Vehicle parts—2,000 ea—$98,300

Diamond T Motor Car Co., Chicago, Ill.
Vehicle parts—1,400 ea—$152,460
Vehicle parts—10,800 ea—$29,421

Dismuke Tire & Rubber Co., Clarksdale, Miss.
Hardware—20,150 ea—$27,781

Douglas Aircraft Co., Inc., Santa Monica, Calif.
Maintenance parts—324 ea—$101,573

— E —

Eclipse-Pioneer Div., Bendix Aviation Corp., Teterboro, N. J.
Bearing—3,300 ea—$28,515

The Electric Auto-Lite Company, Toledo, Ohio
Vehicle parts—20,000 ea—$35,280
Vehicle parts—32,000 ea—$38,016

— F —

Fargo Motor Corp., Detroit, Mich.
Truck, ambulance—20 ea—$86,368

Federal-Mogul Service Dic., Federal-Mogul Corp., Coldwater, Mich
Vehicle parts— 2,250 ea—$44,696
Vehicle parts—16,450 ea—$39,450

Federal Motor Truck Co., Detroit, Mich.
Vehicle parts—1350 ea—$50,260
Automotive spare parts—19,842—$38,588
Automotive spare parts—16,656—$55,933

The Ferry Cap & Set Screw Company, Cleveland, Ohio
Vehicle parts—225,000 ea—$32,558

Fletcher Aviation Corp., Pasadena, Calif.
Kits—$614,704

Fruehauf Trailer Co., Detroit, Mich.
Semitrailer—57 ea—$120,993
Spare parts—2895 units—$4,248,540

(*Turn to page* 170, *please*)

Reprints from this or other Logbook pages are available for your files. Request them from our Redwood City, California office

Varied applications show versatility of National Syntech* springless oil seals

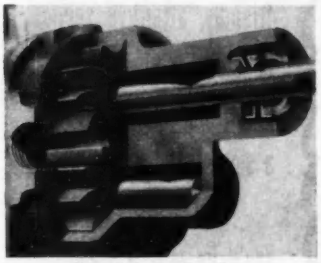


Figure 1. Rotary Gear Pump

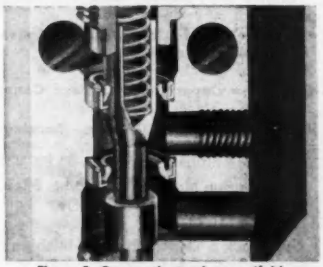


Figure 2. Pneumatic steering manifold

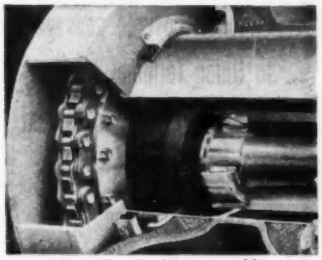


Figure 3. Wheel drive assembly

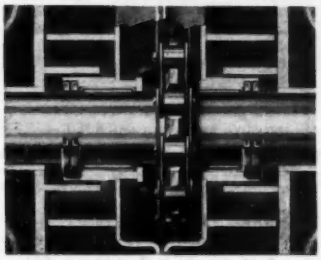


Figure 4. Garden tractor rotor shaft

Syntech springless oil seals have many features which recommend them for a wide variety of sealing applications.

1. Accurately trimmed "knife-edge" sealing lips provide positive sealing.
2. Low shaft pressure results in low torque loss (particularly valuable on fractional horsepower equipment).
3. Pressure or vacuum may be effectively sealed.
4. Standard synthetic sealing material is resistant to most industrial fluids.
5. Compact size often simplifies machinery design.

In the Oberdorfer Gear Pump (Figure 1) National Syntechs serve as pressure seals with the sealing position subjected alternately to pressure and vacuum. Two standard-design National 340,000 series seals (Figure 5A) are mounted back to back, preventing pressure leakage and loss of vacuum. The outer seal also prevents foreign matter from entering pump bearings or mixing into fluid passing through the pump.

National Syntechs also serve as pressure seals in the Le Tourneau pneumatic steering manifold (Figure 2). Here a special-design Syntech (Figure 5B) with an extra thick, specially compounded sealing member is used to withhold pressures up to 130 p.s.i. The seals operate without lubrication on a reciprocating shaft. Sealing members are bonded to a special steel-truss frame.

Figure 5. National Syntech Seals
(A) 340,000 series (standard)
(B) Special design (C) Special design

A third type of springless Syntech is shown in Figure 5C. This is an unusually large, dual-lip special design which seals between the wheel drum and chain case of a heavy earth mover. Sealing is on a drum approximately 25" in diameter. External abrasive conditions are extreme, and the sealing point receives constant road shocks. However, the inherent "flex" of the opposed Syntech lips provides dependable lubricant retention and effectively excludes dust and dirt from the assembly.

National springless Syntech seals are also used in other non-pressure applications. On the garden tractor rotor shaft (Figure 4) two pairs of standard-design National 340,000 seals are mounted back to back. The outer seals exclude mud and dirt from the bearings, and inner seals retain S.A.E. #90 lubricant. The four seals are simple to install or replace and occupy less space than the single-lip spring-loaded seals formerly used.

Both special and standard-design National Syntech seals are utilized in the examples presented here. Some machine designs require special seals. In others, standard-design seals serve well, often at considerable savings in cost and engineering time. Why not consult with National Oil Seal Engineers next time you specify seals? They will be glad to help provide the exact seals required by your design.

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(*Continued from page* 168)

— G —

Gar Wood Industries, Inc., Wayne, Mich.
Winch, assembly—100 ea—$31,552
Vehicle parts— 580 ea— $31,831
Vehicle parts—1075 ea—$176,030

General Electric Co., Electronics Div., Syracuse, N. Y.
Capacitor—3 ea—$39,943

GMC, Cadillac Motor Car Div., Detroit, Mich.
Vehicle parts—29,000 ea—$54,492

General Motors Corp., Detroit Diesel Engine Div., Detroit, Mich.
Diesel engines—14—$37,487

General Motors Corp., Electro-Motive Div., LaGrange, Ill.
Repair parts—31,445—$45,825

GMC, New Departure Div., Bristol, Conn.
Hardware—84,000 ea—$50,939

GMC, Oldsmobile Division, Lansing, Mich.
Rocket assemblies—2,650,000—$5,007,000

GMC, Pontiac Motor Div., Pontiac, Mich.
Carrier, cargo amphibious—196 Veh. 4 sets—$16,733,293

GMC Truck & Coach, Pontiac, Michigan
Trucks—39,201—$296,202,562
Automotive spare parts—39,076—$76,-621
Automotive spare parts—22,945—$326,-412
Vehicle parts—5800 ea—$30,508
Vehicle parts— 226 ea—$30,286
Vehicle parts—1000 ea—$45,263
Vehicle parts—8100 ea—$32,157
Automotive spare parts—58,760—$78,475

GMC United Motors Service, Detroit, Michigan
Automotive spare parts—12,500—$969,-500
Hardware—46,400 ea—$93,359
Tank spare parts—550—$30,069

The B. F. Goodrich Co., Akron, Ohio
Hardware—32,000 ea—$84,045
Hardware—32,000 ea—$84,045

The Goodyear Tire & Rubber Co., Akron, Ohio
Wheel & brake assembly—$140,075
Wheel assembly—558—$1,347,557
Brake assembly—558
Pin—for brake assys.—18,620 ea—$37,-452

Grace Metal Products Co., Philadelphia, Pa.
Vehicle parts—14,000 ea—$174,580

Greer Hydraulics Inc., Brooklyn, N. Y.
Propeller test unit—10 ea—$68,130

The Grote Mfg. Co., Bellevue, Kentucky
Hardware—63,016—$38,739

Grumman Aircraft Engineering Corp., Bethpage, L. I., New York
Spare parts—2150 ea—$34,287
Maintenance parts—7094 ea—$28,115
Maintenance parts—1602 ea—$37,877

— H —

Hercules Motors Co., Canton, Ohio
Spare parts—$89,486
Vehicle parts—22,594 ea—$62,463

Hiller Helicopter Co., Palo Alto, Calif.
Spares for H-23 transmission—35,439 ea —$107,606

Houde Engineering, Houdaille-Hershey Corp., Buffalo, N. Y
Damper assy—67 ea—$35,163

(*Turn to page* 172, *please*)

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CHICAGO — Edgewater Beach Hotel
BOSTON — The Somerset, The Puritan, The Shelton
RESORTS — Whitehall, Palm Beach, Fla. Samoset, Rockland, Me.

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The Turn of a Screw!"

"Stop pulling my leg," Bill retorted skeptically.

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"What kind?" asked Bill.

"RB&W's new SPIN-LOCK Screw," answered Bob. *"It has a patented feature—ratchet-like teeth under the head—that not only locks into the surface and holds tighter, but also speeds assembly. It does away with extra parts and special handling. Bet your switches could use 'em, Bill."*

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Model PD-204L ¼" Pneumatic Drill — Weight 3 Lbs.

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(Continued from page 170)

— I —

International Harvester Co., Detroit, Mich.
Automotive spare parts—6690—$45,031
Automotive spare parts—1770—$33,457
Engine, w/accessories—377—$476,320
Engine, w/accessories—1400—$2,625,000

— J —

Jack & Heintz, Inc., Cleveland, Ohio
Vehicle parts—325 ea—$98,260
1500 VA Inverters—435 ea—$201,718

Kelsey-Hayes Wheel Co., Detroit, Mich.
Metal parts for shell—640,000—$3,040,000
Shell—561,571—$4,128,771

— K —

Kendall Machine & Tool Co., Battle Creek, Mich.
Automotive spare parts—10,758—$322,626

Kollsman Instrument Corp., Elmhurst, N. Y.
Air speed indicator—5160—$1,060,147

— L —

Landers, Frary & Clark, New Britain, Conn.
2500 BA Inverters—2000 ea—$580,290

Libbey, Owens, Ford Glass Co., Toledo, Ohio
Vehicle parts—5000 ea—$134,350

— M —

McQuay-Norris Mfg. Co., St. Louis, Mo.
Vehicle parts—30,000 ea—$60,300

M-N Metal Prod. Co., Hazel Park, Mich.
Kit, enclosure—1257—$142,066

Machine Tool & Die Co., Detroit, Mich.
Vehicle parts—1400 ea—$147,000

Mack Manufacturing Corp., Washington, D. C.
Truck—213 ea—$3,260,817

Macomb Auto Supply, Mt. Clemens, Mich.
Vehicle parts—350 ea—$27,930

Marathon Foundry & Machine Company, Chicago, Ill.
Vehicle parts—7200 ea—$82,842

The Glenn L. Martin Co., Baltimore, Md.
Spare parts—835 ea—$77,172

Monroe Auto Euipment Co., Monroe, Michigan
Vehicle parts—4000 ea—$30,260
Metal parts for shell—222,500—$407,056

Mott Haven Truck Parts, Inc., Bronx, N. Y.
Vehicle parts—75 ea—$79,500

Mutual Truck Parts Company, Inc., Chicago, Ill.
Vehicle parts—270 ea—$29,025

— N —

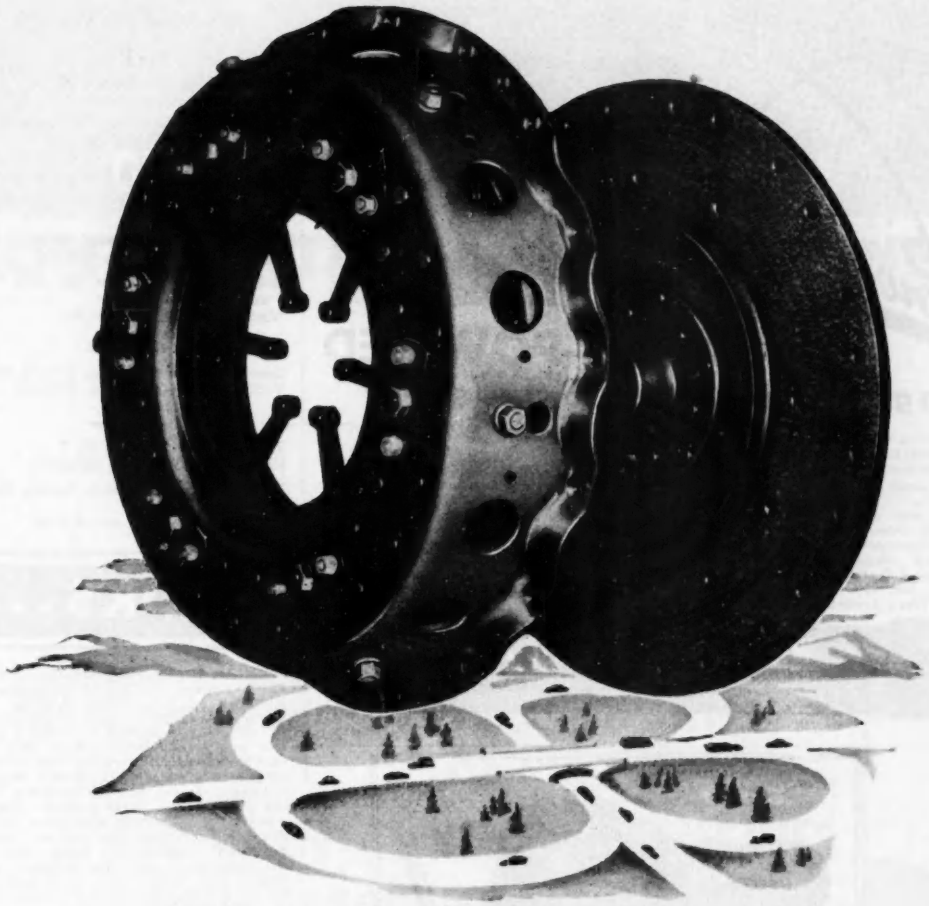
North American Aviation, Inc., Columbus Div., Columbus, Ohio
Spare parts—92,410 ea—$209,681

Northrop Aircraft, Inc., Hawthorne, Calif.
Guided missile program—$236,639

Northwestern Auto Parts Company, Minneapolis, Minn.
Vehicle parts—1523 ea—$116,281

Novi Equipment Co., Novi, Mich.
Vehicle parts—575 ea—$43,317
Hardware—13,900 ea—$61,577

(Turn to page 174, please)



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Rugged, durable Long clutches have met the heavy-duty requirements of vehicle manufacturers since 1922.

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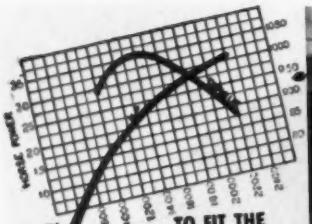

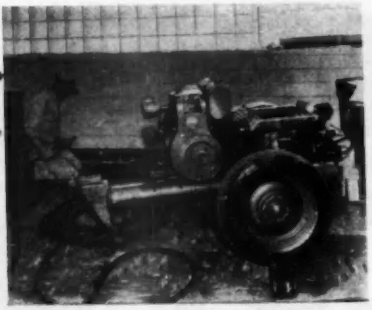

Power TO FIT THE MACHINE AND THE JOB

WISCONSIN-POWERED
Ingersoll-Rand Compressor

Wheeling a modern, mobile compressor to any spot it's needed is easy when it's an Ingersoll-Rand. Then doing a day's work on location is also a "sure thing" if a Wisconsin Heavy-Duty Air-Cooled Engine supplies the power.

The search for full-rated power that's dependable ends almost always with Wisconsin Engines . . . first choice everywhere, 3 to 30 hp. For example, every Wisconsin Engine crankshaft rides at both ends on tapered roller bearings, reducing the chance of bearing failure. Also, Wisconsin Engine magnetos mount on the OUTSIDE for easy servicing, but most important each magneto is equipped with an impulse coupling for quick starts in any weather. Steady running is assured, too, because of fool-proof air-cooling, summer and winter. Follow the lead of many who say, "Wisconsin Engine Power fits the machine and job." And, write today for "Power Magic" covering all 4-cycle single-cylinder, 2-cylinder and V-type 4-cylinder models, 3 to 30 hp.

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Send for our 32 page catalog of Vises, Work Positioners and Industrial Clamps.

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(Continued from page 172)

— P —

Prestyle Mfg. Co., Detroit, Mich.
Automotive spare parts—1584—$65,821

Purolator Products, Inc., Rahway, N. J.
Hardware—13,900 ea—$61,577

— R —

Remsel Industries, Inc., Chicago, Ill.
Vehicle parts—22,000 ea—$43,714

Reo Motors, Inc., Lansing, Mich.
Vehicle parts—2400 ea—$34,862

Robbins Tire & Rubber Co., Inc., Tuscumbia, Ala.
Hardware—9726 ea—$53,395

— S —

Sav-Way Sara Seal, Inc., Detroit, Mich.
Vehicle parts—25,000 ea—$276,250

— T —

Titeflex, Inc., Newark, N. J.
Hardware—133,000 ea—$63,573

Triplex Corp. of America, Pueblo, Colorado
Vehicle parts—5800 ea—$25,618

BOOKS . . .

MANUFACTURING PROCESSES, *Third Edition, by Myron L. Begeman, published by John Wiley & Sons.* Intended as a text for engineering students, the third edition of this well known book has been revised in accordance with recent developments in practice and includes entirely new material for certain chapter headings. Among the new chapters are: the introduction; cold forming; miscellaneous processes; and press work. Other chapters have been rewritten to include much new material. The outline form of the presentation, covering processes, materials, and machine tools lends itself for use as a reference source for practicing engineers and production men.

ESSENTIALS IN PROBLEM SOLVING, *by Zuce Kogan, published by Zuce Kogan, 72½ Sheridan Rd., Chicago, Ill. Price, $3.00.* Said to present a workable approach to problem solving both on and off the job, this book is designed to serve as a concrete guide for the practical man interested in developing new ideas and unraveling complex difficulties. The author states that executives, research men, engineers, technologists, etc., will benefit greatly from the methods which he prescribes for facing problems, analyzing them, and proceeding through to final solutions. Case histories of how industrial and other types of problems have been solved by the recommended techniques are given.

HANDY TOLERANCE TABLES, *by Alexander Michael, Sr., published by Handy Length Book Co., 3507-17th St. S.W., Canton, O. Price, $2.00.* Containing 144 pages of industrial tolerance tables in both decimal and fractional equivalents, this booklet is designed to minimize figuring. The publication is divided into two parts—the first section is made up of 14 tables devoted to standard and industrial fractions and decimal equivalents to three places with tolerances for ±.01 to ±.25 while the second part contains 14 tables of machining tolerances to two decimal places and nearest fraction with the difference to three places and tolerances from ±.01 to ±.25.

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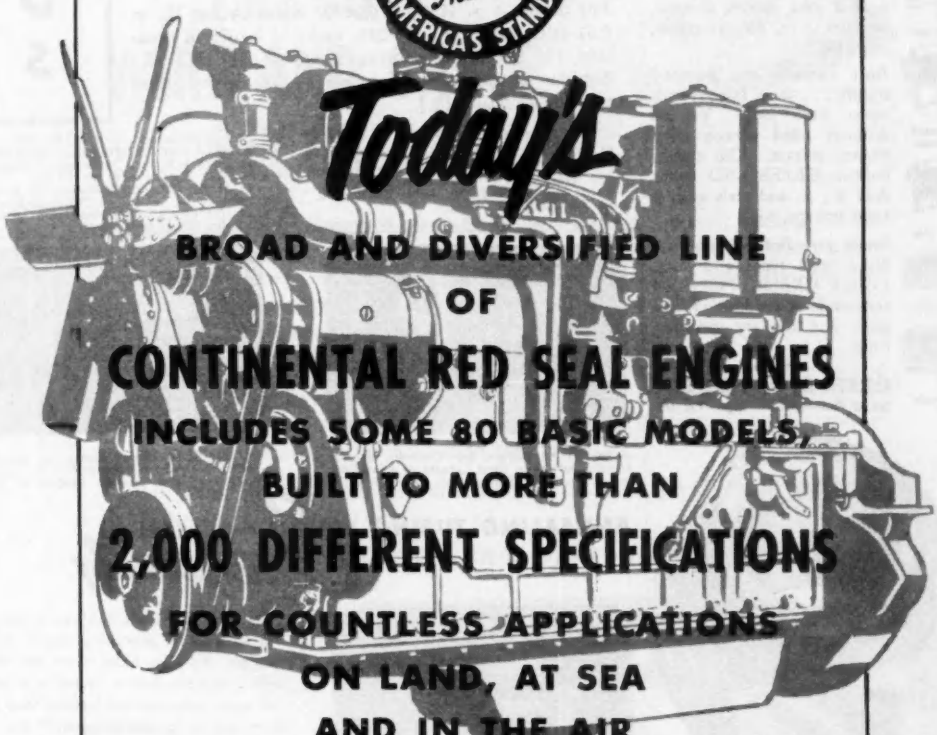

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Faster assembly . . . no more failures of fasteners. GREER STOP NUTS hold firm against jolts, shocks, shimmy, wobbles . . . any vibration, any kind.

Bolt threads are gripped tightly . . . these famous nuts *never* work loose. Yet an ordinary hand wrench gives instant release. The tough, built-in GREERCOID collar does it . . . and seals against fluid leakage, too!

Study *your* fastener problem. Over 3000 types and sizes. Consult GREER. Proved on thousands of products. Meets gov't and military specifications.

Write
GREER STOP NUT CO.
2620 Flournoy, Chicago 12, Ill.

GREER Stop Nuts

Determination of Combustion Products

(*Continued from page* 51)

By substitution:

$$N_2 = 3.785\ O_2 + 3.785\ CO_2 + 1.892\ CO - 1.892\ H_2 - 3.785\ CH_4 + 11.268\ (CO_2 + CO + CH_4) \quad (7)$$

trogen may also be found by difference:

$$N_2 = 100 - O_2 - CO_2 - CO - CH_4 - H_2 \quad (8)$$

Eliminating N_2:

$$O_2 + CO_2\ [1.0 + 2.355\ \theta] + CO\ [0.604 + 2.355\ \theta] - 0.186\ H_2 - CH_4\ [0.582 - 2.355\ \theta] = 20.9 \quad (9)$$

Let η = (O_2 required for complete combustion)/(O_2 actually used.)

$$\eta = \frac{[CO_2 + CO] + \frac{1}{2}\,[H_2 + H_2O] + 2CH_4}{O_2 + CO_2 + \frac{1}{2}\,[CO + H_2O]} \quad (10)$$

$$\eta = \frac{(1 + 2.978\ \theta)\ (CO_2 + CO + CH_4)}{O_2 + CO_2\ (1 + 2.978\ \theta) + CO\ (0.5 + 2.978\ \theta) - CH_4\ (1 - 2.978\ \theta) - \frac{1}{2}\,H_2} \quad (11)$$

For octene $\theta = H/C = 0.1679$. Substituting $H_2 = 0.51\ (CO)$, and $CH_4 = 0.22\%$ and $\theta = 0.1679$ in equation (9) gives the plotting equations [1] and [2.] Similar substitutions in equation (11) above gives plotting equation [3.]

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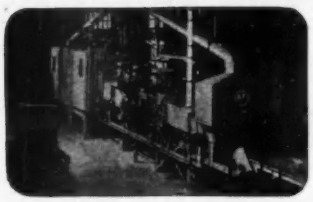
(3) Gerrish, H. C., and Tessmann, A. M.—"Relation of Hydrogen and Methane to Carbon Monoxide in Exhaust Gases from Internal Combustion Engines" —N.A.C.A. Report 476, pp. 53-61.

(4) Hottel, H. C., Williams, G. C., and Satterfield, C. N. — "Thermodynamic Charts for Combustion Processes," Part I, p. 7, John Wiley and Sons, 1949.

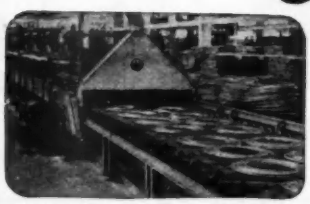
BUY BONDS



A Special Atmosphere Belt Conveyor Electric Furnace Annealing Short Lengths of Alloy Tubing—Operates at Temperatures up to 2040° F.

EF Gas Fired Forced Convection Continuous Roller Hearth Special Atmosphere Furnace Bright Annealing Long Straight Lengths of Tubing.

ANNEALING TUBING BRIGHT and CLEAN *Continuously*

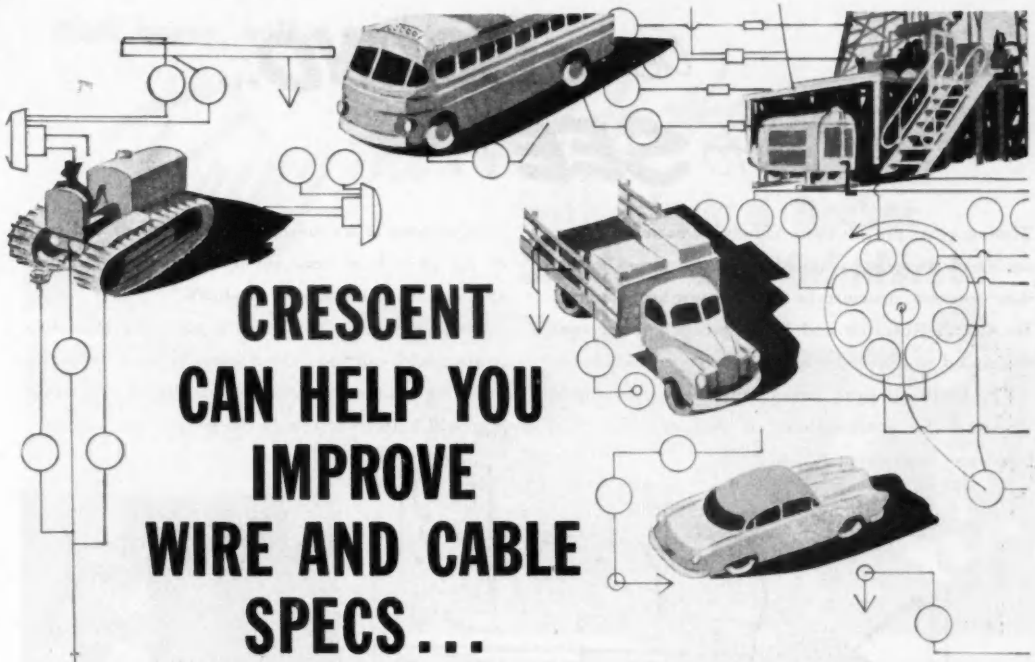


Straight Lengths of Tubing up to 5" in Diameter and ¾" Thick Are Also Annealed in This EF Forced Circulation Roller Hearth Furnace.

We have built many outstanding production furnaces for processing copper, brass, stainless, aluminum, nickel, silver and other ferrous and non-ferrous tubing — in large and small coils—straight lengths, long and short, and in various diameters — also for wire, strip and many other products and processes.

Put your production furnace problems up to experienced engineers—IT PAYS.

Gas-Fired, Oil-Fired EF *and Electric Furnaces*
for any Process, Product or Production
THE ELECTRIC FURNACE CO.
WILSON ST. at PENNA. R. R. *Salem - Ohio*
Canadian Associates • CANEFCO LIMITED • Toronto 1, Canada



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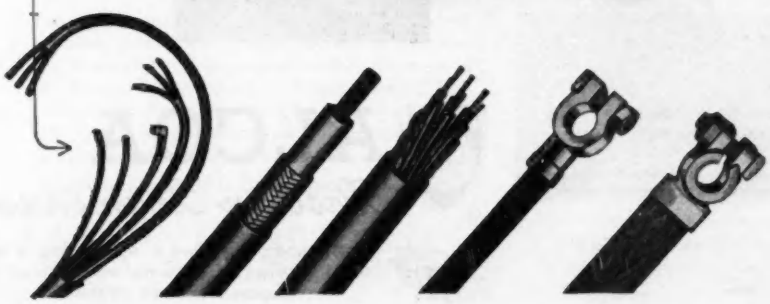


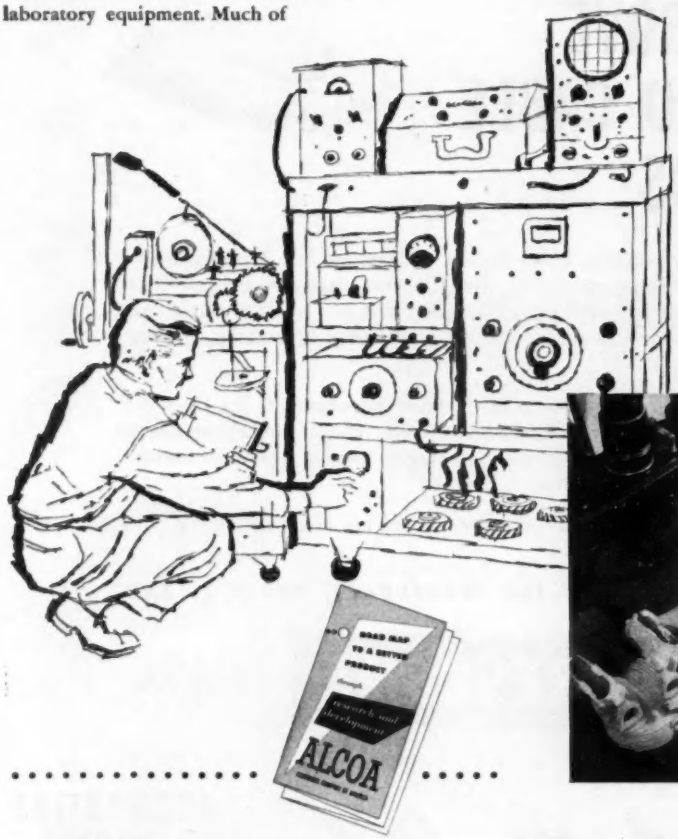
AUTOMOTIVE WIRE AND CABLE

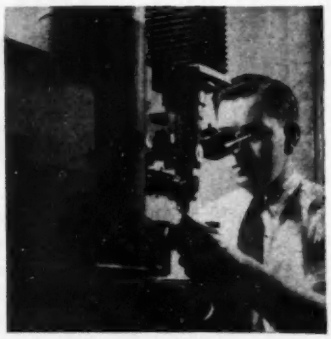
Using SOUND... to SEE!

Timing gears project their sounds on harmonic wave analyzers. Forgings, excited by sonic waves, reveal their internal structure in shifting sawdust patterns. So Alcoa's Research and Development Laboratories use sound to "see" the hidden secrets of aluminum.

The sonic and other testing apparatus shown here illustrate the completeness of Alcoa's laboratory equipment. Much of it exists only at Alcoa—for Alcoa designed and built it. All of it is at your service to further aluminum applications in automotive products.

To get in touch with Alcoa's engineering specialists in your field, call your Alcoa sales engineer. Or write, outlining your project. Sketches or engineering drawings will help in assigning the proper specialists.





Metallographic microscope used to observe aluminum alloys at 1,000 diameters.

X-ray examination checks soundness of aluminum cylinder head.

ALUMINUM COMPANY OF AMERICA
1841-K Gulf Bldg., Pittsburgh 19, Pa.

Gentlemen:
Please send me a free copy of "Road Map to a Better Product," outlining Alcoa's research and development facilities.

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Work heavy, bulky, hard to move?

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shoot down production costs

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Here's how Vibration-Proof SPEED NUT brand fasteners save weight, assembly time, materials handling... step-up product quality.

SPEED NUTS are busy everywhere in industry, making lightning-fast, self-locking attachments...saving manufacturers thousands of dollars and stepping-up production to new highs! The examples of SPEED NUT savings in the aircraft applications illustrated here are typical results of Tinnerman fastening engineering know-how. Whether you build aircraft, or automotive assemblies, there's a SPEED NUT way to really important savings through better fastening methods!

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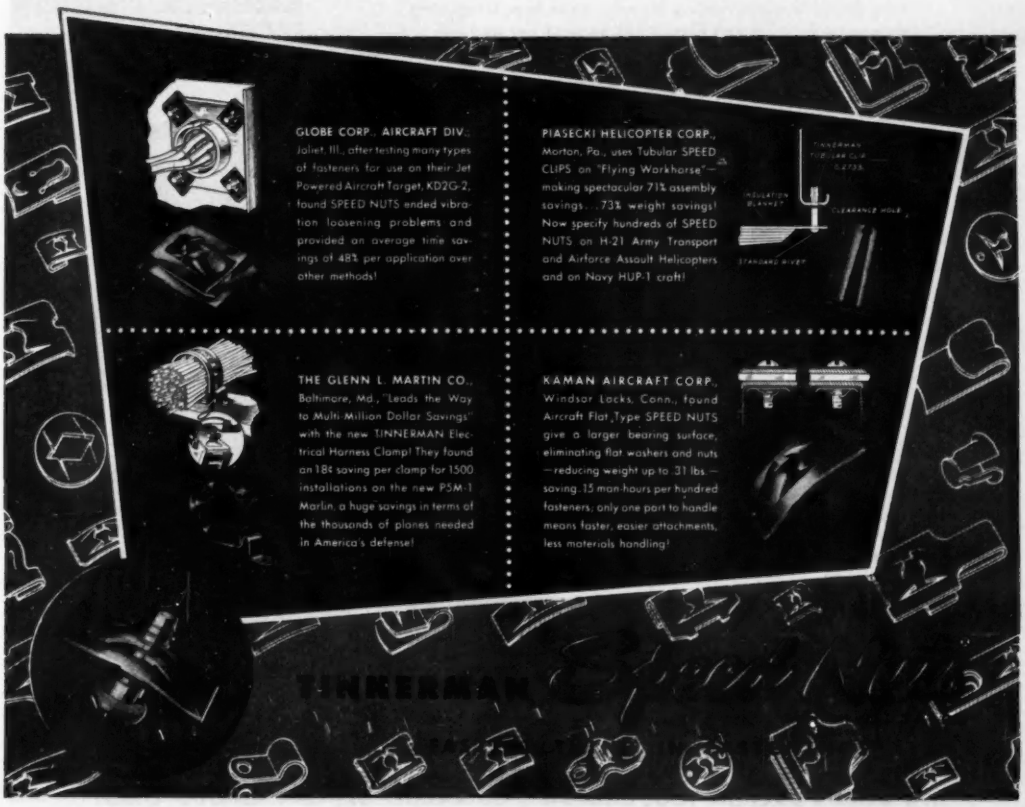
GLOBE CORP., AIRCRAFT DIV., Joliet, Ill., after testing many types of fasteners for use on their Jet Powered Aircraft Target, KD2G-2, found SPEED NUTS ended vibration loosening problems and provided an average time savings of 48% per application over other methods!
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AUTOMATIC PISTON BALANCING MACHINE

For the first time, this MORRIS Mor-Speed Production Machine makes piston balancing 100% automatic. Parts are unloaded automatically from a standard conveyor, processed or rejected and returned to the conveyor "untouched by human hands."

Underweight or grossly overweight pistons are automatically rejected without interrupting the production flow. Depending on a cycle time ranging from 5 to 8 seconds per part, production is 450 to 720 parts per hour varying with the amount of metal to be removed from each piece at 80% efficiency and to a plus-or-minus one gram accuracy limit!

MORRIS Automatic Piston Balancing Machines are used by a number of the major automotive producers. If you have a piston production line, let Morris Engineers show you case history proof of time, labor, money and floor space savings.

Write today for NEW bulletin describing and illustrating the revolutionary MORRIS Piston Balancing Machine.

The Morris Automatic Piston Balancing Machine takes only 27.3 square feet of floor space to turn out up to 12 accurately balanced pistons every minute!

a better product at less cost with precision PLUS *production*

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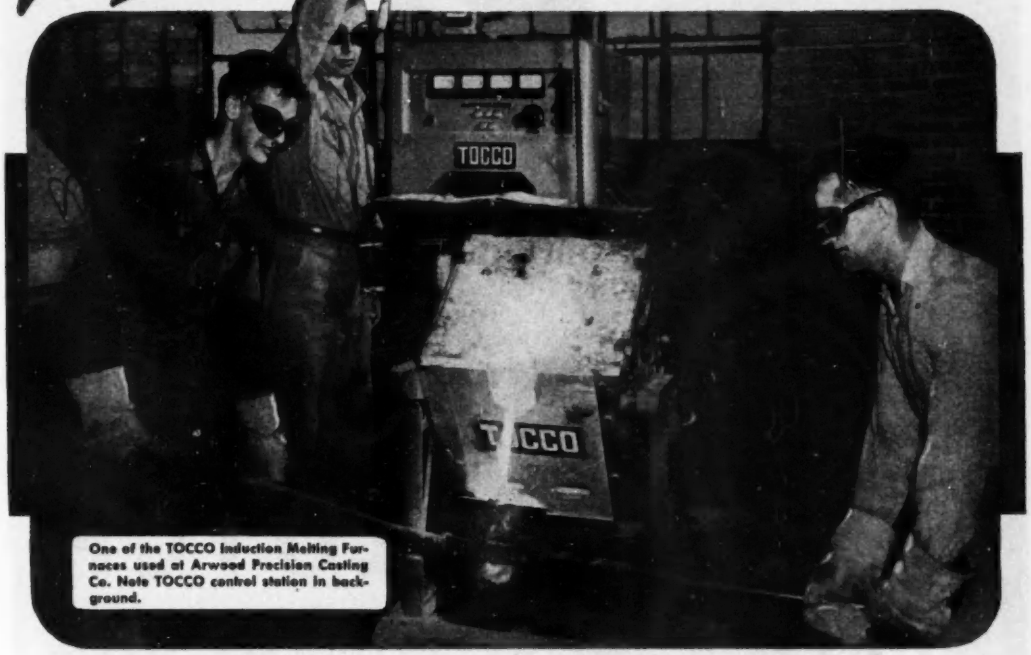
Now! TOCCO* Induction Melting Furnaces for Precision Casting



One of the TOCCO Induction Melting Furnaces used at Arwood Precision Casting Co. Note TOCCO control station in background.

● Engineers at Arwood Precision Casting Co. use TOCCO Induction Melting Furnaces for melting and remelting quality steel. Other companies have found TOCCO equally adaptable for melting non-ferrous metals. No wonder! *Look at the advantages:*

- ★ Stepless power control
- ★ Extremely Rapid Melting
- ★ High Efficiency on Intermittent Operation
- ★ Good Mixing because of Natural Agitation
- ★ Extremely Low Alloy Loss
- ★ No Carbon Pick-up
- ★ No Contamination when Composition of Charges is Changed
- ★ High Reproducibility of Results
- ★ Minimum Space Requirements
- ★ No Special Installation Charge
- ★ Simple, Safe Operation
- ★ Clean, Comfortable Working Conditions

If any of these advantages suggest economies in your operations write for full details—no obligation, of course.

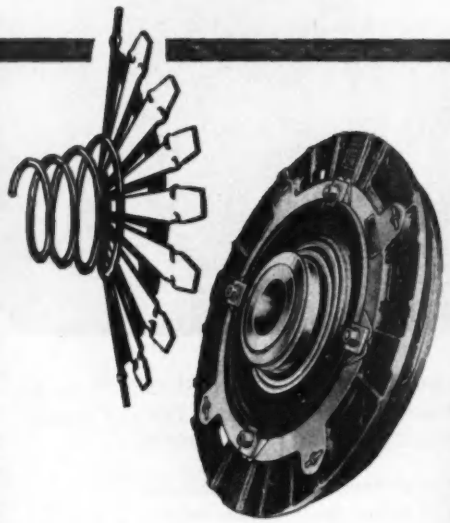
THE OHIO CRANKSHAFT COMPANY • CLEVELAND 1, OHIO

TOCCO

Induction Heating Equipment must meet the requirements of the Federal Communication Commission's Rules and Regulations Relating to Industrial, Scientific and Medical Services, Part 18. All TOCCO equipment is certified to comply with these rules and regulations.

Like a hand of steel *in a velvet glove*

The SOFT Acting Clutch with the SURE GRIP



The hand of steel in the Lipe Clutch has 20 fingers that equalize the pressure of a *single* spring—assuring softer engagement and a positive grip.

LIPE MULTI-LEVER CLUTCH

Lipe's soft engagement, positive grip Multi-Lever Clutch never needs babying. It engages smoothly—without grab, shock or jerk. All parts of the pressure plate touch at the *same instant* with the *same* pressure. There's no cocking—no point of high slippage and spot burning.

Result: *More mileage between tear-downs.*

Write for Service Manual and complete data on genuine Lipe parts—stocked in principal cities.

LIPE ROLLWAY

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Manufacturers of Automotive Clutches and Machine Tools

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ALCOA FOIL keeps 'em rolling... Fast!

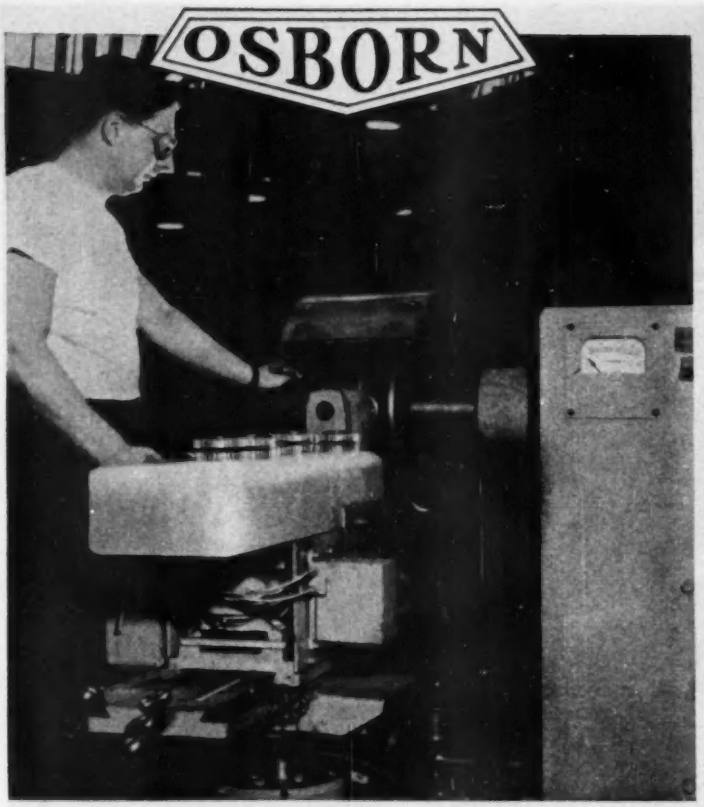
Drop this precision bearing into an inner foil-kraft bag . . . heat seal it . . . that's *all*. You've protected it against rust and dirt. When and where the bag and outer carton are opened . . . even years later . . . the bearing will be factory perfect. Ready for immediate use.

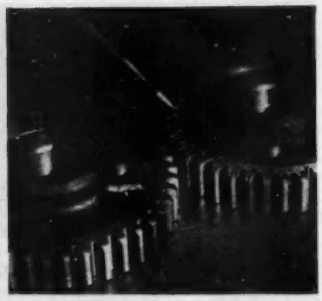
Experts in automotive packaging pioneered many aluminum foil uses. One of the leading companies went over to foil for better protection—and was able to replace a complicated six-step operation with the simple foil-kraft bag and carton you see above!

If your product needs special protection look into the many possible applications and advantages of Alcoa Aluminum Foil. Let us send you the names of reliable packaging firms, qualified to give you information on current material availabilities as well as capable assistance with your present or future planning.

Write to: Aluminum Company of America, 1764K Gulf Building, Pittsburgh 19, Pennsylvania.

ALCOA





RESULTS ARE UNIFORM. Burrs and sharp edges are removed uniformly. Every gear has smooth, uniform, rounded edges. Surfaces are blended. These gears were deburred on the machine shown at the left.

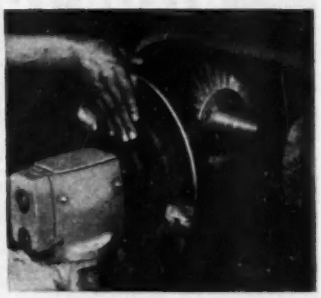
SET-UP IS SIMPLE. The machine is highly adaptable where production involves either large runs of a few parts or small runs of many different types and sizes of gears. Machine setups may be quickly made by unskilled operators. The complete brushing cycle is controlled automatically by the electronic timer which is set for any desired brushing interval to suit the size, shape or condition of part being brushed.

Formerly 20... now deburrs 125 per hour

A new machine . . . the Osborn Work Holder Brushing Lathe . . . now deburrs gears and similar parts *at the push of a button!*

In the plant of Caterpillar Tractor Co., this automatic machine deburrs and finishes gear teeth *six times as fast* as the former hand method. Production now is 125 gears per hour. Output formerly was 20. Burrs and sharp edges are now removed uniformly. Every gear tooth has smooth, rounded edges and surfaces are blended.

Find out how you can speed deburring and improve product quality with this versatile Osborn machine. Call your **O**sborn **B**rushing **A**nalyst today or write *The Osborn Manufacturing Company, Dept. 847, 5401 Hamilton Avenue, Cleveland 14, Ohio.*



OPERATION IS SPEEDY. The operator mounts the gear easily and quickly. The gear advances to the face of two rotating Osborn brushes and the edge of the gear teeth makes contact with the brushes. To assure fast, positive action on each piece brushed, an automatic control reverses the direction of brush rotation on every cycle of operation. This machine deburrs 14-inch hypoid gears in 1½ minutes compared to 25 minutes for former method.

Osborn Brushes

INVESTIGATE IT TODAY

for *your* problems. Users report time savings ranging from 20% to 1570% with the Osborn Work Holder Brushing Lathe. Let us demonstrate what it can do for you!

OSBORN POWER, MAINTENANCE AND PAINT BRUSHES AND FOUNDRY MOLDING MACHINES

Serving the automotive industry...

U.S. Rubber's Plastics Center

Practically every plastic known to science is molded and extruded at the United States Rubber Company's Chicago Die Mold Plant.

Here, serving the automotive industry and original equipment manufacturers, are research technicians and engineers who work unceasingly at improving and making better plastics. They study operating requirements, anticipate new developments, compound new types of plastics.

For example, two of the remarkable plastics developed by "U.S." technicians are Uscolite and Enrup. Uscolite has such high impact strength that it easily withstands a .44 calibre revolver bullet fired from 20 yards. **Lightweight and amazingly versatile,** it retains unusual toughness at temperatures as low as —40° F., yet remains rigid and dimensionally stable at temperatures as high as 170° F.

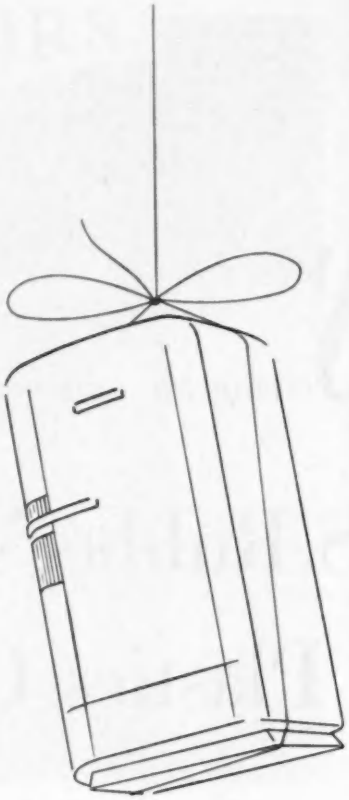
Enrup can be made as flexible as soft rubber, or as rigid as hard rubber. Both Uscolite and Enrup are resistant to most chemicals and have excellent dielectric properties.

A "U.S." Automotive Sales Technician will gladly assist you in selecting the right type of plastic for your product or application. And remember that, in addition to their own skill and research data, **these technicians have at their command the entire resources of the nationwide chain of plants and laboratories which comprise the United States Rubber Company.**

PRODUCTS OF U.S. RUBBER — SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION · ROCKEFELLER CENTER, NEW YORK 20, N. Y.



When reputation hangs "by a thread"

the *source* of your threaded fasteners becomes vastly important

It's unlikely that any customer will ever know or care where you get the screws, bolts and nuts that hold your product together. But if just one of those threaded fasteners fails to hold properly and causes the customer serious inconvenience, your product gets the blame. To that extent, your hard-won reputation literally hangs "by a thread."

When you look to Pheoll for your every need in screws, bolts, nuts and special threaded fasteners, you've gone all the way toward making sure of *uniform, high quality*. Pheoll's half-century of experience, constant research and rigid product inspection assure this. And with Pheoll Quality, you now get these PLUS services!

First, new, efficient procedures for production scheduling and order control that add up to "delivery promises that count." ***Second,*** truly modern facilities so extensive they'll easily meet your toughest schedule demands or volume requirements. ***Third,*** cost saving design and engineering assistance to simplify your fastener problems. ***Fourth,*** experts in special products, and producers of the most complete standard product line in the screw industry. ***Fifth,*** continuously large inventories of both finished goods and raw materials assure prompt deliveries of your requirements.

The full facts are so remarkable they've been put into a booklet titled, "Pioneering in Customer Service." May we send it to you?

PHEOLL

SCREWS
BOLTS
NUTS

MANUFACTURING COMPANY
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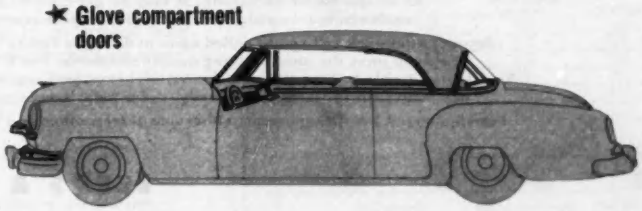
MOTOR PRODUCTS

A DEPENDABLE GUIDE to the FINEST in METAL FINISHING

The name of "Motor Products" has reflected quality workmanship for more than 35 years.

★ Windshield mouldings
★ Window ventilators
★ Garnish mouldings
★ Glove compartment doors



★ Radiator grilles
★ Instrument panels
★ Body mouldings

MOTOR PRODUCTS CORPORATION
11801 Mack Avenue Detroit 14, Michigan

• You can ease that production pinch . . . present or future . . . with Leeds & Northrup job-fitted Furnaces.

Job-fitting of L&N furnaces can . . . if you wish . . . include two stages of planning.

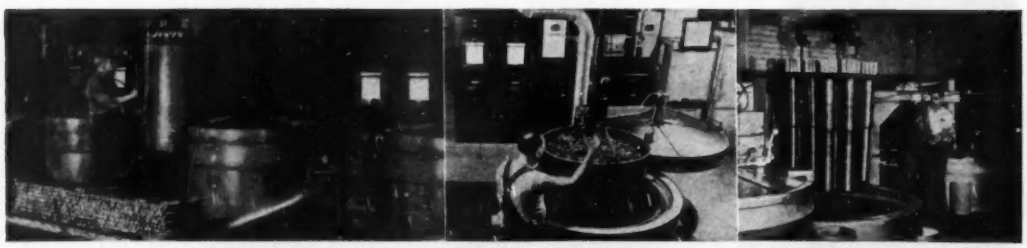
First is choosing the furnace equipment for the job you want done at present. It may be tempering or hardening; it may be gas-cyaniding, steam treatment, nitriding or carburizing . . . on big loads or small; at high temperatures or low.

Second, what work will you be called upon to do in the future? With L&N equipment you'll be ready to meet the most exacting quality standards. You'll find it efficient for cost-cutting. You'll find it able to take the punishment of heavy loads, quick heating and round-the-clock use. With L&N furnaces you're ready . . . for today's *and* tomorrow's heat-treating problems.

For engineered job-fitting contact either our nearest office or 4966 Stenton Ave., Phila. 44, Pa.

Jrl. Ad T620(35)

LEEDS & NORTHRUP
instruments • automatic controls • furnaces



Big production for small space with L&N furnaces is due to high ratio of net to gross load; to compact design; and to thorough insulation. Furnaces are made in sizes for every parts heat-treating need, from smallest shop to largest plant.

With dense loads (as machine-gun clips shown here) Homo's streamlined heating passages, big heaters and blowers give fast, accurate, cost-cutting production.

With bulky parts Homo Furnace vertical construction, large size and ability to hold work either racked, stacked or on fixtures give ample capacity.

Cylinder bore wear REDUCED . . 84.6%

Main bearing wear REDUCED . . 77.9%

Rod bearing wear REDUCED . . . 93.3%

Piston wear REDUCED 78.4%

with

PUROLATOR

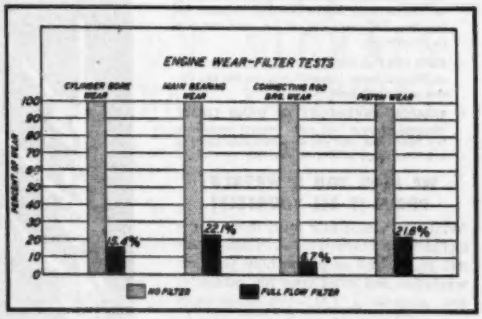
FULL-FLOW

MICRONIC FILTERS

THESE ARE THE RESULTS of tests just completed by one of the world's largest automobile and engine manufacturers.

The purpose of these tests was to determine how much the Micronic Full-Flow element reduces wear.

Running standard gasoline engines under extremely adverse conditions, test engineers found that Purolator Micronic* Full-Flow filtration was the best of all tried . . . far superior to any partial-flow filter.



The secret of this amazing performance is the Purolator* *Micronic* Filter Element with *ten times* the filtering area of old-style filters. It is the *only* element capable of delivering full-flow rates during its entire service life, with effective, dependable filtration down to *microns* (0.000039 in.)!

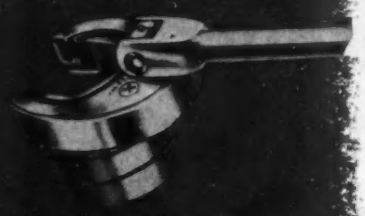
Purolator's Engineering Department will gladly cooperate in helping you adapt super-efficient Purolator Micronic Full-Flow filtration to your own requirements. *Just write!*

*Reg. U. S. Pat. Off.

PUROLATOR PRODUCTS, INC.
Rahway, New Jersey and Toronto, Ontario, Canada
Factory Branch Offices:
Chicago, Detroit, Los Angeles

PUROLATOR
MICRONIC OIL FILTER
"FIRST IN THE FIELD OF FILTERING"

this wrench



can slash your costs 3 ways

TAC Open End Ratchet Wrench
(SOCKET TYPE)

delivers incredible savings wherever "tight" situations prevail involving tubing, pipe, conduit, cable or long studs. Saves at least three ways:

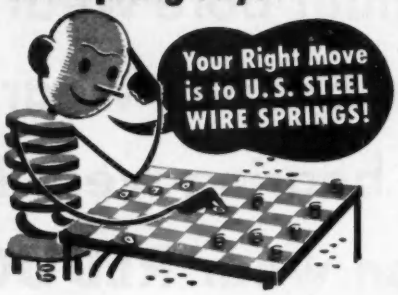
1. **CUTS TIME** on production or maintenance operations because it slips around tubing and down fittings, where you ratchet off or on in more seconds. Functions perfectly with as little as 7° arc clearance for handle. Reduces workman injury too—TAC can't slip off the work and skin up knuckles.
2. **CUTS COST** on fittings, tubing, etc. Snugs down on fittings, never "barks" or scars the hex fitting or strips thread.
3. **REDUCES INVENTORY OF HAND TOOLS** required in your tool crib. Several sockets, a few head sizes, and you eliminate over half the wrenches you'd otherwise maintain.

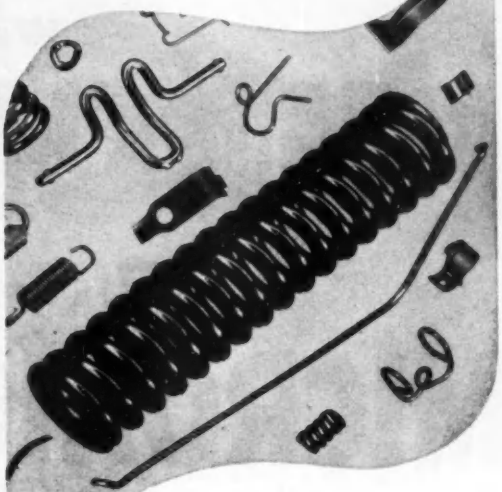
WE LEND YOU A WRENCH: PROVE IT ALL YOURSELF!

Write on Company stationery for a CATALOG and details on our TOOL-LENDING PLAN. Tell us please how you use wrenches and what your big problems are. BORROW A TAC—USE IT—it costs you nothing to PROVE TAC'S value in *your* plant. Act now!

TUBING APPLIANCE COMPANY
10321 Anza Avenue, Los Angeles, California

Coil Spring says:





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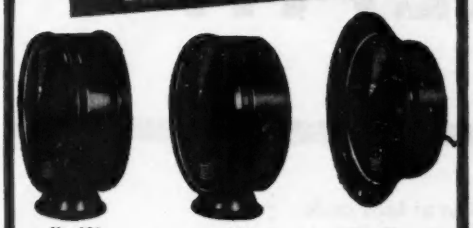
CLASS "A" TYPE 1 DIRECTION SIGNALS for ORIGINAL EQUIPMENT

Exceed latest S.A.E. Specifications — State Approved • Tested by Electrical Testing Laboratories, Inc. • Scientifically Designed Stimsonite Lenses

SLIM	2⅛" in depth
SLEEK	No openings to let in water and dirt
STURDY	Single hollow stud mounting — no excessive vibration
PRACTICAL	Only one brass screw to service bulb or lens — round mounting
SWITCH	Burn-out proof, self-cancelling or non-cancelling
ACCEPTED	As original equipment by leading Truck and Trailer manufacturers. Ask for specifications and prices

THE REGULAR MODEL DIETZ CLASS "A" TYPE 1 DIRECTION SIGNALS



Lower price model featuring Stimsonite Lenses, single hollow stud mounting, snap ring lens retainer. Available with burn-out proof, self-cancelling or non-cancelling Switches.

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You should know the truth.

We have prepared a 20-page booklet that graphically and concisely presents the complete story. A copy is yours for the asking.

THE MALAYAN TIN BUREAU

Department 40

1028 Connecticut Avenue Washington 6, D. C.

There Is Plenty of Tin in Malaya

MALAYAN TIN BUREAU

How do you Guide a Missile?

WHAT does it take to put a "brain" in a projectile —a "mind" that makes it know where to go, and when to explode? For that matter, how do you open garage doors and light the driveway at the beep of your horn . . . or throw out one faulty package from thousands in a food-packing plant?

It takes special metals for such miracles—high-alloy steels and special magnetic materials of the types in which we have pioneered and are today leading producers. For any job which requires something more than ordinary steels can give you, look first to the ***Allegheny Ludlum Steel Corporation . . . General Offices: Oliver Building, Pittsburgh 22, Pa.***

PIONEER in Specialloy Steels

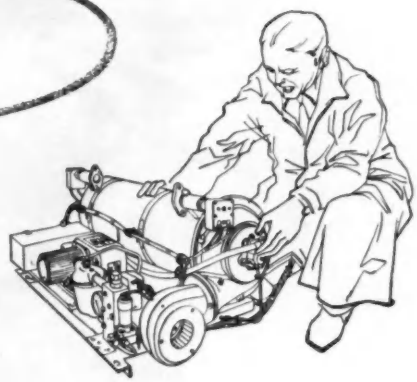
Allegheny Ludlum

WAD 3075

AL TIME-TESTED STAINLESS STEEL

HOW THE MOST ADVANCED

liquid heater



PAYS DIVIDENDS *on your investment*

Any investment is expected to pay dividends. But sometimes dividends are not up to expectations. Transit coach heating equipment is an important investment, and we believe that Janitrol's newest liquid heater, for either diesel fuel or gasoline, will yield bigger dividends per dollar of investment. Engines that operate economically as high as 40% longer between overhauls is one Janitrol dividend. Heating equipment, operating independently of the coach engine, that is cheaper to operate than the overhead on heated, enclosed garages, is another Janitrol dividend. Engines that are always maintained at optimum operating temperatures, and ready to start easily, regardless of the weather is yet another Janitrol dividend.

Then there is the human side. Coaches without passengers are never profitable, so passenger and operator comfort is another dividend that Janitrol capacity and dependability will always guarantee.

Proof that Janitrol equipment does pay dividends is evident in our steadily rising sales chart. And it's not a flash trend either, but one that has grown consistently with motor coach production over the last eight years. Before you invest in coach heating equipment, better put dividend insurance on your investment by specifying Janitrol. Write for technical bulletins and operating case histories now. Or, if you want immediate assistance, get in touch with your nearest Janitrol representative.

HEAT WHEREVER YOU WANT IT **Janitrol**

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OAKITE GIVES YOU THREE WAYS TO FIGHT RUST

Day and night—wherever your steel is stored or handled—RUST, the biggest thief in America, is robbing you of production, robbing you of profit.

Oakite can help you defeat rust these three ways:

☆ **1 By removing rust from raw steel**—often eliminating pickling by removing rust and oil in one operation.

☆ **2 By preventing rust during processing**—protecting your steel all the way from stamping to shipping.

☆ **3 By preventing under-coat rusting of painted products**—combining cleaning, paint-conditioning and rust-prevention in one operation.

FREE For the Oakite Anti-Rust Kit that tells about these three big ways—plus several other methods—to stop RUST in your plant, write to Oakite Products, Inc., 28A Rector St., New York 6, N. Y.

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Markem Methods are engineered to solve *specific* marking problems. The proper combination of a Markem marking *machine*, Markem *type* and Markem *ink* is matched to the individual requirements. Not only are the properties of the surface itself considered, but also local conditions of temperature and humidity together with your own handling techniques during production, storage and packaging. That is why it is so important that the Markem Method be followed completely.

When you have a marking problem, ask Markem about it. Send a sample of the item to be marked and details of your needs. Markem engineers have worked out practical solutions for many manufacturers. Markem Machine Company, Keene 8, N. H.

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BURDETT "RADIANT HEAT" OVEN

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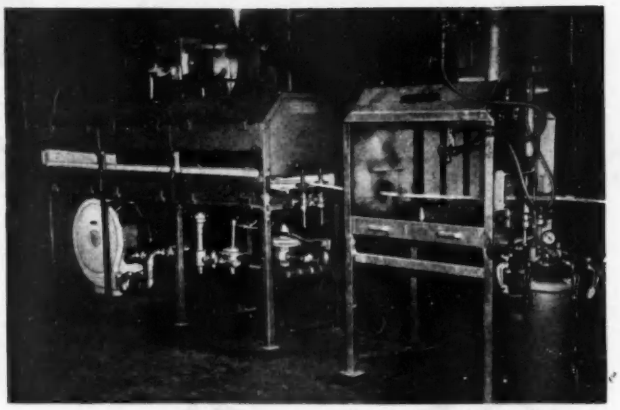

Photo courtesy of Metal Mouldings Corp.

BURDETT
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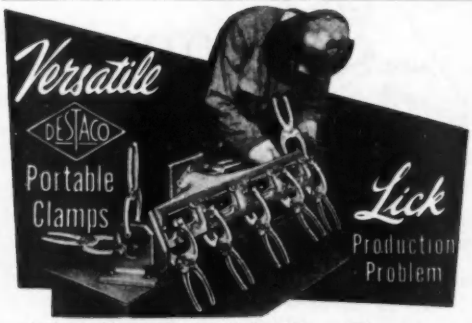
Also Manufacturers of "Radiant Heat" Systems, Ovens, Heaters, Air Make-Up Units, Spray Booths and Washers.



Courtesy Steel Cooperage Division of the Serrick Corp.

The versatility of De-Sta-Co Toggle Clamps is demonstrated by this unique welding fixture designed by the Steel Cooperage Division of the Serrick Corp. The fixture holds four rectangular and three round manifold flanges to an alignment plate during the inert arc welding operation. "V" type prongs replace one jaw on three of the 12 Model #468 portable clamps to give additional gripping area. The quick, positive holding pressure of the clamps cuts set-up time to a minimum and permits precise alignment of the manifold flanges. Rapid toggle action, sure holding pressure, ease of work removal and rugged durability make De-Sta-Co portable clamps the logical choice for this production application.

There's a De-Sta-Co Toggle Clamp engineered for your work holding problems in assembly, welding, bonding, machining or inspection of any material. Select from over 40 fixture and portable models. Positive holding pressures up to 4000 pounds. Write today for a copy of the De-Sta-Co catalog describing available stationary and portable toggle clamps.

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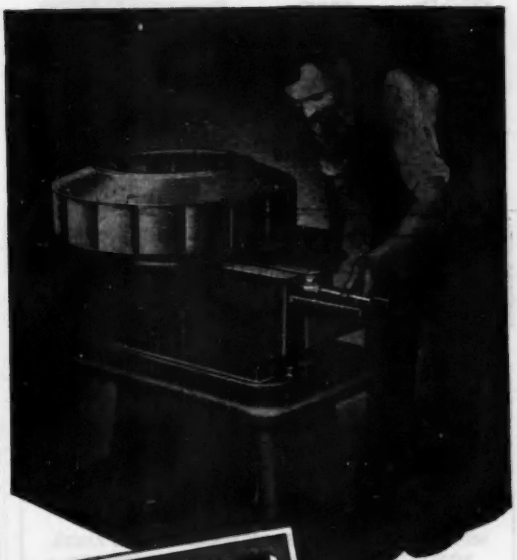

HI-EFF BALANCING

- *Fast*
- *Accurate*

This 250-pound blower fan is being balanced to a 1 ounce inch on a HI-EFF Balancing Machine. The same Balancer is used for a wide variety of pieces up to 1200 pound size. It provides rapid balancing with accuracy indicated by the following tolerances:

Pieces weighing 500 to 1200 pounds, within 2 oz. inches.

Pieces weighing 75 to 500 pounds, within 1 oz. inch.

Pieces of lighter weights to diminishing tolerances down to .02 oz. inch.

HI-EFF Balancing machines are available in 9 sizes with work piece diameters up to 48 inches. These may be equipped with HI-EFF Hand Weighing Mechanism (as shown) or HI-MAX Direct Reading Mechanism. Write for folder "Balance Your Product."

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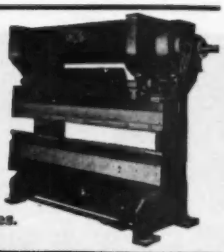

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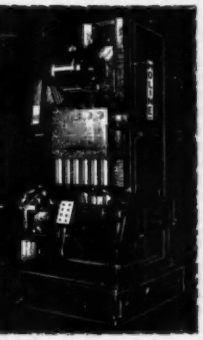

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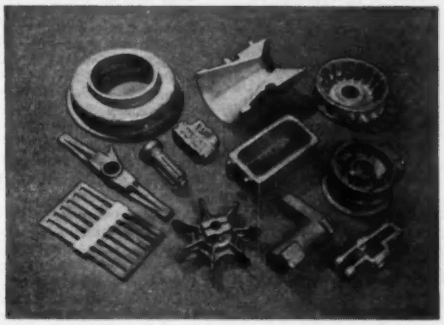

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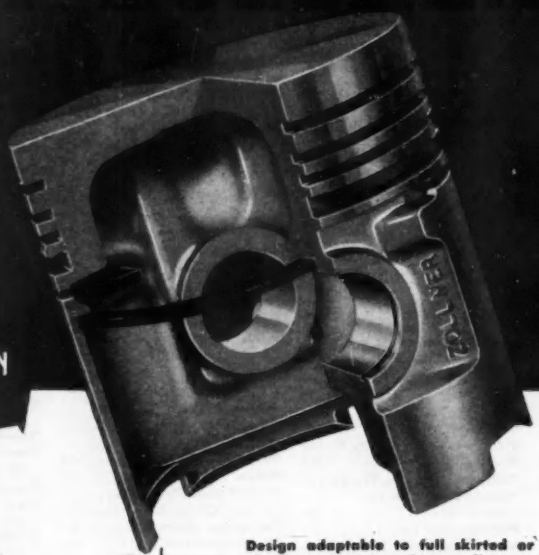

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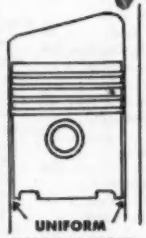

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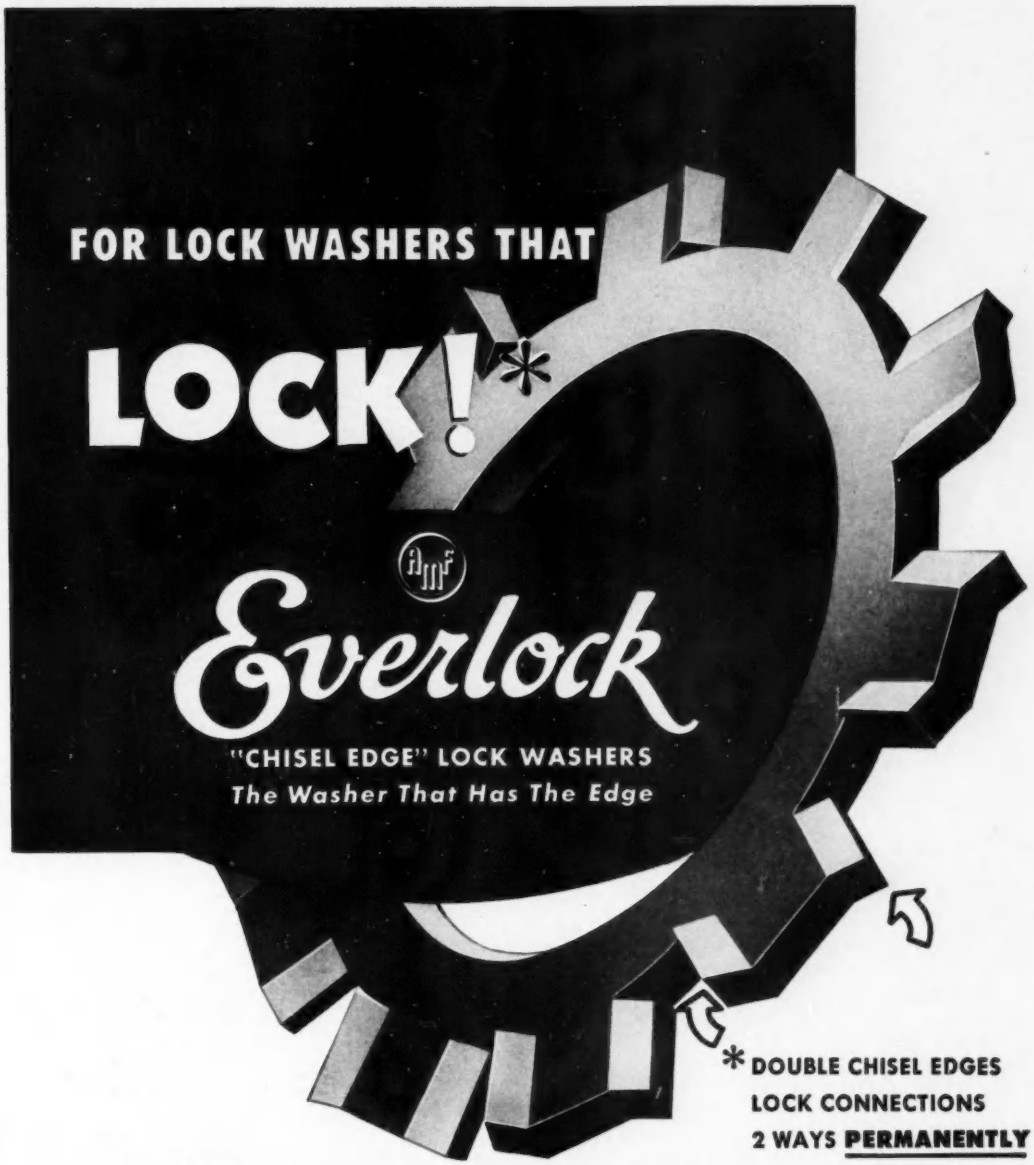

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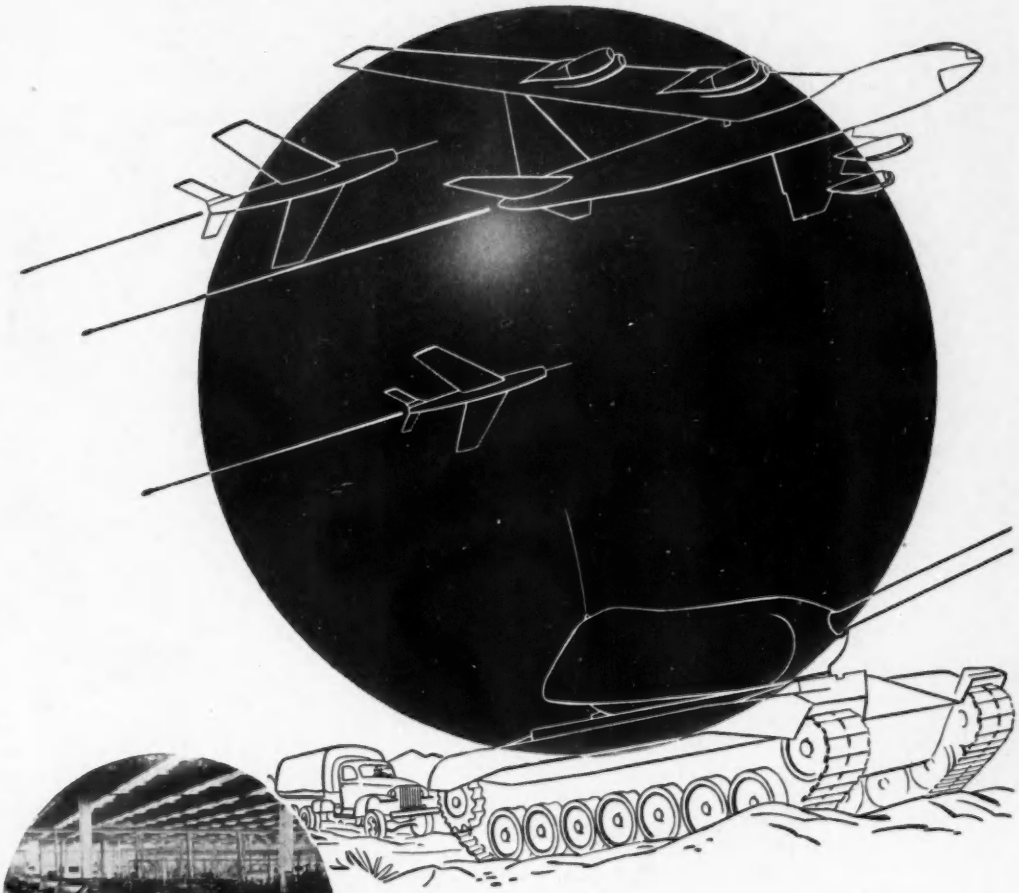

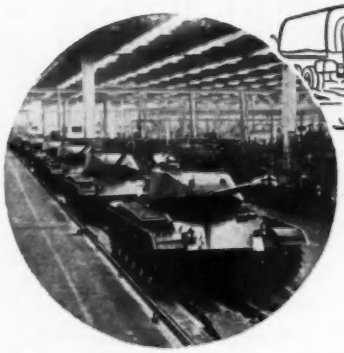

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